ARE YOU NEW TO EARTH?

Cirino's Guidebook for My Descendents and Theirs

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LEARN SOMETHING EVERY DAY

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PREFACE

A paraphrase is offered below from a man significantly more accomplished than myself that captures the reason for this volume:

> *"People learn from me in a way that they are empowered by what I taught them. My goal is that when people think of what I taught them, they do not think of me, but of their own base of understanding of how this world works. I become irrelevant."*
>
> *"If people later say I know this because Tyson said so, I have failed. That's teaching from authority. I want you to run off with whatever hunger you have with new tools to make the universe accessible to you."– N. D. Tyson*

How many adults despair that they remember learning so little in school, and kids lament that seldom are they taught anything they will use once they graduate? American students surely remember being in elementary school when one day, surprise, you walked in to find your regular teacher absent. I learned several neat things on those days.

A break in the usual learning routine has historically, and accurately, been a cause for concern among educators as the interruption in routine learning is understood to be more important than is generally realized by parents. To parents and children alike, it was almost a day off from school, with a full-time babysitter.

I have been privileged at rare times to be exposed to an exceptional substitute. A person who appreciates they are not intimate with the flow of that class material (even if they are fluent in that grade or subject themselves), seeking to impart something beyond a mundane curriculum. Something that can be taught in a day. Something to inspire, entertain, and give the students something that the least of them can carry forward in life. And it only took one day.

I know parents who do not think their children are learning all of what they need to survive past school. Especially learning how to learn. This is also for whoever wants to feel they know more than just enough to pass the next standardized test, SAT, ACT, or BAR exam. Each one of these talks listed below can take one whole day to chew on. More if you go deep. Pick what you like & the depth.

Even if not all used or remembered, the young should be told there are answers out there. I hope every day of your life might find you able to think competently better than you did yesterday, and perhaps this will help the smallest amount. This is not just for top students, or those waiting for graduation to get on the street. At either end of the academic spectrum, it will benefit anyone to be better at….whatever use you put their hands and minds.

Please consider it.

For parents, how the new humans employ knowledge IS NOT YOUR MISSION. Never has been. My mission is to impart enough truth and knowledge on how humans can be effective. It may occur to home-schoolers that the use of such a day regularly may be a significant edge as they move forward into the world. Just saying…

If you had only one day free of restraint or judgment to teach or learn something that sticks, what would it be? Carpentry? Fencing? Auto mechanics? Cooking? Shakespeare movies?

A Word On Ethics in Science -

> None of the items below are ethical or unethical, moral or immoral. You may be told otherwise.
>
> Parents, religious leaders, and others in positions of trust will preach those things, not science.
>
> As adults, today's children will one day have to carry on making ethical and moral decisions for themselves. This frightens demagogues. Scientific truth, knowledge, and curiosity will make them more competent at whatever. Be brave.

Do not be unarmed. 2024 America is filled with more and more mentally unarmed adult voters and parents – a recipe for disaster.

To believe in yourself, independent of external cheerleaders, is vital. Such people can lead teams, or communities, or go it alone. You need to master skills, embrace vicarious experiences, control social persuasion, and understand your emotional states. But you don't have to have it all figured out before taking your place in the world.

Be tempted.

1 INTERESTING SCIENCE

Did you know:

…Women use an average of 20,000 words a day, compared to the mere 7,000 that men utter.

…If you're in a group of twenty-three people, there's a 50% chance that two of them share a birthday. If you're in a group of seventy people, that probability jumps to over 80%.

…Australia has more kangaroos than humans.

8 of 10 humans who ever lived, even today, live within a few miles of coastlines & rivers. Food, transportation, and you can run into the water if something wants to eat you, or vice versa. If the poles or glaciers melt even a little, and raise the oceans even a little, what's the first places to get flooded? Yeah. Pay attention to that one as you get older.

…There are 40 trillion bacteria living in one human body, most in the intestines. That's way more than the 0.4 trillion stars in the Milky Way galaxy. At an average of less than 10 planets each, it's easily more than all the planets too.

Up to 40% of the dust in your home is shed by human skin. So clean the floors, the shelves and table tops, and change the sheets on your bed. Tiny insects called dust mites live in beds eating the dead skin. Change sheets and vacuum often.

…Wearing a seatbelt correctly reduces the chance of front-seat passenger fatality due to front-end collision by 45%. Seat belts save lives people, so wear them. Also, airbags are more likely to cause injuries rather than prevent them *when seat belts are not worn*.

…Fat leaves our body 80% through the breath. The other 20% leaves our body through water.

…It would take 1.2 million mosquitoes, each sucking once, to completely drain the average human of blood.

…South America is moving away from Africa at about the same speed your fingernails grow.

…Girls: if you are in danger, you can silently signal for help using the TicTok wave – fold your thumb into your palm, then fold down your fingers, then open flat and repeat. At some bars, if you order an 'Angel Shot' it is a call for help. With all the online dating and date-drugs out there, learn what signal or drink to order in your area of the country.

…Boys: if you pee on a pregnancy test, and it's positive, go to a doctor: you may have something.

…Everyone: if you are approached by a loose service dog, follow it immediately; you may save someone's life.

…if ever at a beach and the waves pull away super far, run for your life: a tidal wave tsunami is coming.

…if you ever fall onto a NYC subway track, and a train is very near, do not try to crawl out: dive under the crawl space. Wait to crawl out when the train is passed.

…if you hear a baby crying outside, it is likely a trap: call 911. Either way, you saved yourself or them.

Hold up your hands and clap them together. Wait one second, then do it again. If you could plot the distance between the first clap and the second clap, it would be more than 800 kilometers (500 miles). This is because the Earth is moving around the sun, the sun is moving around the center of the galaxy, the galaxy is moving through the Virgo Supercluster, and the Virgo Supercluster is barreling through the universe. When you add up all the velocities and compare the result to the cosmic microwave background (which is the closest thing we have to a universal frame of reference), it comes out to about 800 kilometers per second. *In the time it took you to read this, you've traveled farther than you'll ever walk in your life.*

3D Printer Academy for Engineers: train wheels are designed as cones to stay on the tracks!

Throw a ball between straight overhead and then down to straight forward to get the best distance. Mathematically, 43 degrees from the horizon was found to be perfect on Earth.

A seat belt has more uses than most people know:

- When buying a car, pull the belt down to read the date. Compare it to the plate on the door frame of the car. If they do not agree, the car was in a bad accident and may be bent or have hidden damage.
- When buying a car, pull the seat belt as far out as it will go. If the bottom is stained with mold or sand, it was submerged in water.
- If you need to push your car, pull out the driver seat belt all the way, close the door on it, and sling it over your shoulder. Now you can use your whole body strength and still have your right arm free to steer through the window.
- If you cannot get out of your car and need to break a door window, use the metal tongue of the buckle to scratch then hit the glass.

You can draw a circle with a string anchored at the center. You can draw an ellipse by using a circular cord stuck on two end axes. If you have a scissor but not a compass, tape a marker or pencil to a scissor and spin it.

Look in a shallow stream or pond at a fish. The fish is always just slightly further than you see it due to light changing direction at the air-water interface. Stand in the water, looking straight down to see where the fish actually is so you can cup it with your hands and throw it on the bank.

A vinegar and baking soda rocket car demonstrates action/reaction.

It took centuries to go from dragging on a flat sled to using round tree limb runners, to wheels.

We were hunters and gatherers. Some smart folks notice the same food grew where they threw the seeds last season when passing by. They started trying to help the seeds for all kinds of foods. This is called agriculture and this big thing made us different than our ancestor, the Neanderthal. They had fire, art, and language. But they never advanced into agriculture.

Once agriculture was invented, we had permanent villages with permanent fires. Certain soil contained a lot of clay, and if molded and set by the fire, would harden into useful cups, jars & plates. Certain rocks oozed when used to line the fire pit, and after cooling the ooze hardened into whatever shape it flowed. Clay would not burn and could be molded into useful shapes for the hot ooze ….metal. Then of course we started looking for it and found many metals that occurred in veins in the same kinds of rocks.

We combined copper with a little tin to make bronze (10,000 yrs ago) Then copper with zinc to make brass. And then got fires hot enough for iron (3000 yrs ago). Then combined iron with carbon to make steel. And so on.

Oil from the ground was thought of as a poison of otherwise good land where it was seen bubbling up. We had used oil from fish and whales and olives for a long time for many things. Fossil oil really took off during the industrial age when it could be purified into kerosene, diesel, gasoline, plastics, etc. It is even used for many pharmaceutical drugs, it seems a shame to waste it on heating blue jeans and cosmetics.

Move something easier by increasing the length of your arm:

-hunters notched a small limb for their spear to throw it further & faster

-apply a lever to a rock -a long handle on a shovel/axe head or hammer gives power

-open a jar by making the lid larger with a dishtowel

-use a fatter screw driver handle (opposite for delicate work = use a thinner handle)

The era of Newtonian Physics: everything is expressed as the movement of discrete particles. Era of Quantum Mechanics: a spectrum of probabilities lay under reality. For example, the first (and current) digital computers worked with bits having binary logic: 2 states = 0 or 1. Quantum computers will use Q-bits, which instead of + or – can be either +/- or some amount of both along a continuous spectrum.

If you find a natural magnet and shape it into a long narrow pin, you can float it in a shallow cup of water or centered on the point of a pin, and it will always point to the north & south poles, + and –.

If you wrap a metal wire around a metal magnet core and rotate it between another coil wrapped around a magnet, you get electricity flowing in the wires. To make a lot of electricity, use the wind or a stream to spin a fan or blade and rotate the core. This is where turbine-generators came from.

Thicker wire holds more power and provides less resistance. Thinner wire holds less power and the resistance is so high that with enough power you can make it glow. Put it in a vacuum under glass and you have the first light bulbs.

If you rub a glass rod on silk, and a rubber rod on fur, you get two charges that attract each other but repel other charges of their kind. Franklin defined them as glass made (+) and rubber made (-). Previously, sailors and explorers used a floating magnetized needle to point to the north and south poles. This means the north-pointing needle is attracted to its opposite, the north pole, and vice versa. By placing a charged glass rod or rubber rod near a compass, we can now define the earth's north pole as (+) and the south pole as (-). The earth's magnetic field flows from the (-) south to the (+) north pole and then down through the core to complete the circuit.

A conductor easily allows a flow of electrons, like metals. An insulator stops the flow of electrons, like glass. A semiconductor can conduct electricity much better than an insulator such as glass, but not as well as metals, such as silicon.

A transistor is a semiconductor that amplifies or switches electronic signals. A transistor consists of three main parts: the emitter, the base, and the collector. The emitter serves as the source of electrons, the collector as the drain, and the base as the control terminal. When a small current flows through the base, it controls the flow of a much larger current between the emitter and the collector. The base-collector junction is reverse-biased, which means that electrons are prevented from flowing from the base to the collector. However, when a current flows through the base it opens up the base-collector junction and allows electrons to flow from the emitter to the collector. It is the core of all modern electronics.

A semiconductor chip is a collection of tiny transistors. Chips are typically made from thin slices of silicon with complex components laid out on them in specific patterns. These patterns control the flow of current using transistors as switches in much the same way you control the electrical current in your home by flipping a switch to turn on a light.

AND/OR gates are basic logic gates used in digital circuits. An AND gate outputs a 1 only if both inputs are 1, while an OR gate outputs a 1 if at least one input is 1. The AND gate performs logical multiplication, while the OR gate performs logical addition.

Steam was known for over 1000 years back to Roman times but containers were large and occasionally exploded. Only after the Watt governor in the late 1700s did it find wide-spread usefulness in powering the industrial age of the 19th and 20th centuries.

There was a Neolithic bronze age culture in America before Europeans could sail more than a row boat, but never evolved to the level of European savagery of iron and gunpowder, but stayed in harmony with their natural environment. Think about how slim a probability has us reaching for moons and planets in this century, when you are alive, how we could have easily been 1000 years more advanced with a Roman governor or still be relegated to pre-industrialization today and be ignorant of the universe. Are we the lucky ones, or did we lose something along the way?

For an interesting read, check out Tyson’s ‘*Astrophysics for People in a Hurry*’ which is pretty neat.

Why science teachers should not be given playground duty.

2 EVERYDAY HACKS

Use the tab on a soda can to hold your straw. How many of you knew that? Here are a few you might not…

Stick a knife into a bottle of stuck ketchup to give it a surface to slide down.

How do you know if the eggs are bad? Fresh eggs sink, and bad eggs float. Similarly, ripe blueberries sink, while the floaters need more time to ripen. Why? Sugar is heavier.

Use toothpaste to clean foggy headlight, then wipe with a wet paper towel. It's also good for bug bites.

Ever need a little lemon juice but then the remainder dries out? Roll the lemon hard, then insert a needle or tiny nail into the bottom to make a tiny hole. Squeeze what you need.

Dry pizza or bread? Turns to concrete if you heat it in a microwave? First, put a few drops of water on both sides before you stick it in for just a few seconds. The micro turns the water to steam and both heats & softens the bread. This works for heating a lot of foods.

To pour out a can of soda – the whole can - raise the tab to center upright, tilt the can onto your glass, and let it go. No over-fizz, no spills.

Going to leave on a trip – put a quarter on a frozen cup of water in the freezer. The power went out if the quarter sunk & refroze. If long enough, food that looks ok has gone bad! If the quarter sunk, ignore the "sell-by date" and check food carefully before using it.

If the tab on a can is hard to lift, use the bottom of another can to open the tab on the new can.

Many times in cooking you need to separate the yolk of an egg from the clear white. Be a hero with parents separating a yoke by squeezing air from an empty plastic soda bottle and sucking up the yolk.

Can opener – instead of sideways as most people do, use it upright – it will open easier and the lid will come away clean.

Chopsticks – separate by applying spread pressure to the loose ends as you tap it hard vertically on the table. Then hold using index & thumb together with the first stick held, then middle finger in between and the ring finger pinching the second stick.

Lollipop wrapper. Grab the top & the bottom and twist back and forth. Tootsie pops the same – they are designed as 'leverage wrappers'.

Open pickle jar – The vacuum is what holds it shut too tight, not the lid itself. To break the vacuum put your fingers together and squeeze the sides of the metal lid until it pops! Or use a can opener gently at one end until you hear the vacuum pop.

If heavy tomato sauce won’t come out of a can after you open one end, flip it over, cut open the bottom as well, then push out the bottom lid with a fat wooden spoon. Or tennis racket handle. Clean & neat.

You want to cook your own breakfast when everyone else asleep or gone, say an egg, but not do dishes after? Grease a paper plate, open the egg on it, cover with another paper plate & microwave for 1 minute. Season to taste! Cook a little longer or slower depending on the microwave power. Even bacon cooks this way with no dishes to wash.

Take a used shampoo bottle, cut it almost in half, hold the center over a candle until it bends backward, then let it cool. Hang it over your sink to hold a sponge and a bar of soap, or 2 different sponges.

In trouble from using permanent marker on an erasable board? Toothpaste may erase permanent marker from a board.

Need to hold a stack of papers together but don’t have a big clip? If you have a hole puncher, bind a stack of papers with 2 punched holes, a rubber band, and a paper clip.

You slip a note, a card, or tickets into a spiral notebook but they keep falling out. Use 2 paperclips in the spirals to hold anything like that.

Holding supplies at your desk or table: Tape the cardboard center of a spent duct tape roll to a table leg and insert a large enough tapered plastic cup, like from 7-11.

Use a dead plastic card and 2 clips to hold your smart phone sideways on a desk or table.

When buying a knife, especially a pocket knife, pay more attention to the Rockwell hardness measure than the ‘type’ of steel used. Most folks don’t. A great steel type will fail if a low hardness.

Use a balloon to seal a glass jar without a lid. Blow it up, then press it down on the jar as you let out the air. It will catch. Re-useable too.

Look for antenna lines on smart phone – like tiny bars but not raised like buttons. They are electromagnetic devices. They conduct. You know what else conducts? Hint: it’s mostly made of water, and salt water – your fingers! Don’t put your fingers on the bars or you lose signal strength.

3 Interesting Math Tricks

1. Have someone think of a number between 1 and 10.
   Multiply it by 3.
   Add 6.
   Divide this number by 3.
   Subtract the original number.

   If you tell someone to concentrate hard on the answer, then suddenly announce: "It's 2!" they will be amazed. Just don't do the trick more than once with anyone because the answer is ALWAYS 2.

   Here's another one: Ask to pick another number between 1 and 100.

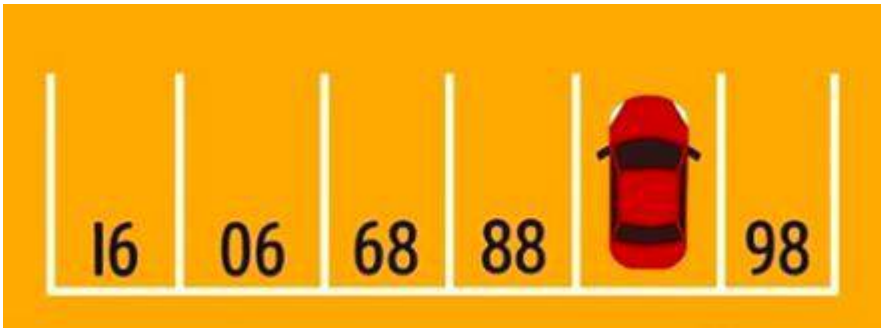
   Tell them to double that number.
   Then, ask them to add 9.
   Subtract 3.
   Divide by 2.
   And finally, subtract the original number.

   No matter whether you use 1, 10, 25, 70, or any other number, the answer is always 3!

2. Think of any three-digit number in which each of the digits is the same. Examples include 333, 666, 777, and 999.
   Add up the digits.
   Divide the three-digit number by the answer in Step 2.
   The answer is 37. It is always 37.

3. Memorize the value of Pi. Given how important this number is, remember this handy sentence and count the letters in each word:
   "How I wish I could calculate pi." = 3 . 1 4 1 5 9 2

4. Many people think they are gifted in art, with graphic vision instead of numerical smarts. Let's find out: Ask them to tell you what is the number under the car in this parking lot.



You don’t need math: just look at the image upside down. The answer is clearly 87. This problem is often given to first graders!

5. This one is for people who think they are gifted in math. Using only an addition, how do you add eight 8’s and get the number 1000?

   Answer: 888 + 88 + 8 + 8 + 8 = 1000

6. I am an odd number. Take away one letter and I become even. What number am I?

   Answer: Seven (take away the ‘S’ and it becomes ‘even’).

7. Another lesson in how assumptions can lead you astray. There is a basket containing 5 apples, how do you divide the apples among 5 children so that each child has 1 apple while 1 apple remains in the basket?

   Answer: 4 children get 1 apple each while the fifth child gets the basket with the remaining apple still in it.

   Again, two girls were born to the same mother, at the same time, on the same day, in the same month, and the same year, and yet somehow they’re not twins. Why not?

   Answer: Because there was a third girl, which makes them triplets!

8. A floating ship in port has a ladder that hangs over the side. The length of the ladder is 200cm, the distance between each rung in 20cm and the bottom rung barely touches the water. The tide rises at a rate of 10cm an hour. When will the water reach the fifth rung?

   Answer: Never. The tide raises both the water and the boat so the water will never reach the fifth rung.

9. There are two ways to solve this problem. Some days you do not have the right equipment, or see things the same way as someone else, but if you are good at math and logic, you can succeed.

   You have a 3-liter bottle and a 5-liter bottle. How can you measure 4 liters of water by using 3L and 5L bottles?

   Solution 1 : First, fill a 3L bottle and pour 3 liters into a 5L bottle.

   Again fill the 3Lt bottle. Now pour 2 liters from the 3L into the 5L bottle until it becomes full.
   Now empty 5Lt bottle.
   Pour remaining 1 liter in 3Lt bottle into 5Lt bottle.
   Now again fill 3Lt bottle and pour 3 liters into 5Lt bottle.
   Now you have 4 liters in the 5Lt bottle.

   Solution 2 : First, fill the 5Lt bottle and pour 3 liters of it into 3Lt bottle.

   Empty 3Lt bottle.
   Pour remaining 2 liters in the 5Lt bottle into 3Lt bottle.
   Again fill the 5Lt bottle and pour 1 liter into 3Lt bottle until it becomes full.
   Now you have 4 liters in the 5Lt bottle.

10. Can you see numerical patterns? Everything from the stock market to animal migrations works on patterns. These are 2-step patterns -

    Look at this series: 36, 34, 30, 28, 24, … What number should come next?
    Answer: 22 (down 2, down 4, repeat)

    Look at this series: 22, 21, 23, 22, 24, 23, … What number should come next?
    Answer: 25 (down 1, up 2, repeat)

    Look at this series: 53, 53, 40, 40, 27, 27, … What number should come next?
    Answer: 14 (same, minus 13, repeat)

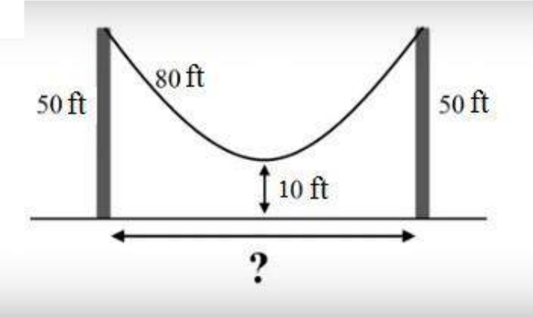
Instead of using the average formula, you can use the balanced average approach. Think of an average as a target that all items in a list are aiming for and you are trying to balance them out to match that target. For example, let's say that you have 5 exams in your history class and you want to get at least a 92 out of 100. So far:

First exam = 81 Second exam = 98
Third exam = 90 Fourth exam = 93
What grade would you need to get on the fifth exam to get a 92 average?

Let's add up how much you exceeded or missed your target on every attempt: - 11 + 6 - 2 + 1 equals - 6. To balance your average you need to make up for those - 6 points by making +6 points on top of your target. You need to make 98 on your fifth exam to reach your target grade of 92.

Complicated? A smart math person would use an equation:
92 = (G+81+98+90+93)/5; so 92 = (G+372)/5 ; so 92x5 = G + 372 so 98 = G

11. IQ question to see if you make full use of what you know **when it looks** like a complex math problem. How far apart are two 50-foot poles when an 80-foot cable reaches down to 10 feet above the ground?



Logically, use what you know. Go to the extremes which are easy to see.

If you moved the poles 80 feet apart, the cable is fully stretched and so must be 50 feet off the ground, the height of the poles. Going the other way, if you put the poles together, the cable is fully slack, straight up and down. Since the poles are 50 feet each, an 80-foot cable can only go down 40 and up 40. That means the cable is 10 feet off the ground.

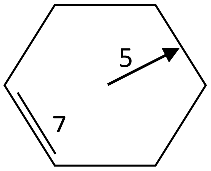
Therefore, the poles are 0 feet apart!

12. Here’s one from World War 2. A physics teacher was told the German artillery was very good at slaughtering troops when they were gathered together before a battle. He looked into it and found they were looking at the local telephone poles through a small telescope, and knowing the height and distance between poles could tell precisely how far away was their target.

So the teacher had the poles changed where the troops were to be gathered. Some were shortened, and some were cut down completely and replanted. The result was the German artillery completely missed them, saving many lives. You never know where math will pop up.

13. On sales: if they say 70% off, great. To find out what you pay on a $150 item, most folks will try 0.7 x $150 (if they have a calculator). If not, they are clever enough to try 10%, then multiply by 7. Best for me is that for 70% off, I’m paying 30%, so .3 x 150 is $45!

14. To find the area of an equal sided shape, multiply the distance from the center to a flat edge x the length of any side x ½(number of sides).



These shapes are called polygons. The one at the left is a hexagon (6 sides).

So the area is 5 cm x 7 cm x ½(6 cm)" = 105 square cm

15. One that a lot of people find helpful, especially if you cook or bake a decent bit, is the following: multiplying fractions: top times top over bottom times bottom . For example, if you want to double when a recipe calls for 3/8 a cup of flour, then
2 x 3 / 8 = 2 x 3 = 6 for the top and 1 x 8 for the bottom. Answer 6/8 or ¾ cup of flour.

16. Many have trouble with percentages, but they are both simple and reversible. To find 18% of 50, it is the same as 50% of 18, which is much easier to figure out without multiplying it out.

17. 50% of 18 = 9 = 18% of 50

18. A trick for dividing by 5 in your head is real simple. Double the number, then just move the decimal 1 place to the left (smaller). For example,
642 / 5 = hard in your head so double it to 1284 then move the decimal = 128.4

19. To add cumbersome numbers in your head, first do easy then do hard. For example, 25 + 56 is done by adding 25+50 then add 6, so 75 + 6 = 81.

How about 422 + 618 = 400+600 = 1000, then 22 + 18 = 40, so 1,040.

How about 73 + 39? Try 70 + 40 = 110. Then 3 more minus 1 is 2 more, so 112.

If you find your mind is strong enough, I recommend doing math the hard way and continue to strengthen your mind!

4 About The Scientific Method

The scientific method was designed to take human flaws and bias out of the search for the truth of how the universe works. This does not include the ‘truth’ of how to live a good life. A moral life. An ethical life. Science cannot help you there. Science is the place where the mathematics and the physics of the universe are revealed. Why the sun appears to rise every morning and where does it go at night? Why does a ship on the horizon eventually disappear but has not fallen off the Earth? Why when you rub a balloon on a fuzzy sweater it will stick to a wall.

We spoke of some of the principles of the *scientific method* above and lay them out again here:

(a) Observation

It always begins with observation. We have 5 senses – sight, smell, touch, hearing, and taste.
They work to keep us alive in a 3-dimensional world of length, width, and height.
They work to keep us alive on a planet we are held to by gravity, eat other living or once-living creatures for energy, drink the water, and breathe the air.

That’s great as far as it goes. But are our 5 senses enough to tell us more? Tell us about things too small to see, too large to understand, or too far away to examine well.

(b) Supposition

We can think. To suppose. To imagine. To figure things out based on incomplete information. Every day you live, you deal with having incomplete information. Is lightning about to strike? Is a meteor about to fall on your head? Is there someone you did not expect about to walk into the room? Is someone going to lie to you and if you believe it what will it cost you?

This ability to make decisions based on incomplete information is critical to science. When man started, he was a hunter-gatherer. Moving around where the food was. Someone noticed that when the seeds from some plant were left on the ground, the next season or next year, a new plant that seed came from started growing. Someone supposed they could gather a bunch of those seeds, plant them, and when they traveled here next year, they would have a lot more to eat. They didn’t know why, but they *observed* it was true, *supposed* they could encourage it. For some plants, for some seeds. But they didn’t know why.

(c) Theory

If you make sufficient *observations* and have a *supposition* about what’s going on, you are on your way to forming a *theory*. Your theory will explain why something is happening, or why it did not happen. Some seeds from certain plants could never grow. Some seeds if very old or very young would not grow, but seeds aged just right would. Or with the right amount of water or sunlight. Thus man started using numbers to quantify their theory. Math and logic became something not only used to count how many seeds you had or how many steps it would take to reach the next hill, but something useful to predict the future.

(d) Experimentation

No *theory* can be accepted unless it is verified by *experimentation*. If someone performs an experiment and claims this type of seed will grow into a plant next year, another will repeat the experiment. And another. Eventually, we came to know what kind of seeds this would work for, knew that some liked this kind of soil and others that kind of soil. Some liked more sun and others more shade.

If results predicted by a *theory* cannot be duplicated by others using the same conditions, that *theory* is flawed. Go back to *observations* and then *suppose* something else.

Some theories are hard to build an experiment to verify. Sometimes, the math will show you what is going on, support the theory, and eventually an experiment can be devised.

(e) Revise Theory

If results predicted by a theory are found to work sometimes and not other times, the theory is then modified to include the results of other new experiments. In this way, theory improves until fact is claimed.

A theory may only explain what happens half the time. If it works at all, a scientist will look at where it fails and instead of throwing it out will sometimes modify the theory to include more results.

In 1500, the celestial wheel theory assumed the Earth was at the center of the planets and the sun, which everyone could see with their own eyes, and that everything moved around the Earth in perfect circles. When telescopes got better, we saw the planets not moving in perfect circles, but blipping now and then. So the theory was modified to say a big perfect wheel and another smaller wheel on it explaining the blip. Eventually, the telescopes got good enough that there were so many wheels on wheels that it was ridiculous. Copernicus did his math and found everything smoothed out nicely if you put the sun in the center, and the Earth rotated around it with all the other planets each in their own orbit. Gone was the *celestial wheel theory*.

(f) Scientific Fact

Just before 1915, Einstein proposed that his math showed light – which was always observed to travel straight – would be seen to bend if near a large enough gravity well. His math was solid, but no experiment could be conducted for years until telescopes got better. They saw the planet Mercury slip behind the sun faster than it usually traveled, and pop out the other side also faster, then resume its usual steady speed. A triumph of math creating a theory and experiment confirming it to be true. We now know light can be bent by the bending of space itself, and otherwise appears to travel in a straight line. Fact. We know the speed of light in a vacuum is 3.8 x 1010 m/sec in a vacuum and slower in other media. Fact. We have calculated the curve of the Earth by watching ships on a calm ocean to estimate its size and found when we went into space that is was almost perfectly round, not flat. Just squashed a little from spinning and the pull of the moon. Fact. We found that the tides come in and go out on the oceans because the position of the moon pulls at the water, which unlike the land can flow very easily. Fact.

(g) Repeat As needed

Even scientific facts can be revised. Newton's math supported his theories of motion. This was proven time and time again by archers shooting arrows, cannon balls flying in an arc, or how fast something could go depending on how hard you pushed it against friction. Time was a constant and only moved forward at one rate. Tested and proved everywhere.

Yet even these previously reliable facts had to be modified when motion happens near the speed of light. Near light-speed, time slows own for that object, its mass increases, and its length decreases. Just a little, but that math was proven when we had a clock put on an airplane around the world and an identical clock left on the Earth. The clock in motion came back having lost a little time. This has been repeated many times, verifying this new theory of motion under *special relativity*.

If you think scientifically, it is easy to change theories and even improve facts over time. It is a slow process but continues to move forward. The circle of all knowledge continues to grow, but so does the perimeter of ignorance. If you do not think scientifically, your knowledge will not grow and ignorance wins in the darkness.

5 Useful Math

There will likely come a time when you will hear yourself say, “I wish I remembered the math on how to do that!” It is absolutely true that mixed in with all the historical dates you couldn’t care less about, what idiot was king when a war was fought, or whatever else you will have long forgotten, there were gems of math that could actually serve you in real life after school.

For the very few of you who speak math better than you do English, look into the Journal for Applied Math and Geometry at www.SIAM.org Control theory math guides robot hands placing doors on an assembly line, algebraic geometry determines how a computer can drive itself down the road, experimental design math tells companies the best (or worst) ways to conduct prescription drug trials, algebraic topology will show how gene regulatory networks contend with the cause of diseases, tensor network math will govern the physics of quantum computers.

This is all beyond most folks in their daily lives. What I include here is something everyone else can do without being a math guru or science whiz.

This is your math cheat-sheet for living smarter.

a. How many gallons of paint are needed for a wall of x ft * y ft?

Reads the paint can: it tells you it covers 70 ft2.

Measure your wall: using the same units as the can, it measures 10ft x 30 feet plus 10ft x two 20-foot sides.

How many square feet do you have? 10 * 30 + 2 (10 * 20) = 300 + 2(200) = 700 ft2

So you need wall size/paint coverage = 700 / 70 = 10 gallons of paint. Too easy?

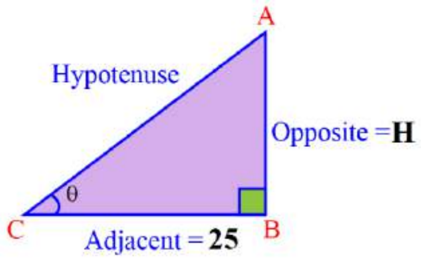
b. If I cut that tree down, will it hit the house?

Draw a triangle.

Measure the bottom of the tree to the house = 25 feet.

Label the base of the triangle = 25.

Label tall side H for height of the tree.



Use a protractor to look up from the bottom of the house to the top of the tree and read the angle. If you know the angle and the length of the adjacent side and want the side opposite the angle, what trigonometry function is that? Tan(angle) = opposite/adjacent.

So look in a math book or on the internet for the Tan(30 degrees) = 0.57735

Opposite = 0.57735 * 25 ft = height of tree = 14.4 ft.

If the height of a tree is longer than the distance from the base of the tree to the house, smash!

If the height of the tree is less than the distance to the house, it will not hit it.

Other useful trigonometry are Sin(angle) = opposite / hypotenuse & Cos(angle) = adjacent / hypotenuse

With trigonometry, you can find how long a rope you need to stretch from a point in the yard to the roof, or how high a toy rocket flew, just by seeing a triangle and measuring the parts you know.

c. If I hear lightning, how far away & is it moving closer?

Lightning travels at the electromagnetic speed of light: 186,000 miles/sec.

The sound of thunder travels at the speed of sound: 1125 feet/sec.

If you see lightning, it got there almost the instant it started. Immediately start counting off seconds. If it takes four seconds before you first hear the thunder,

4 x 1125 ft = 4,500 ft or just less than a mile (1 mile = 5,280 ft)

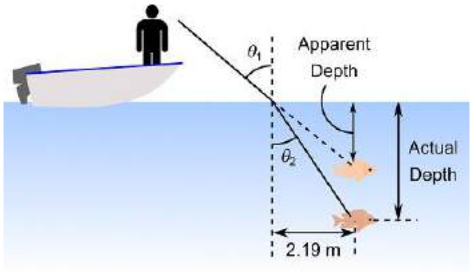
If the next bolt of lightning is followed by thunder <4 seconds later, it is moving to you. Take cover indoors! If it takes >4 seconds, it is safely moving away from you.

d. If I see a fish below me in the pond, where do I shoot or spear it: closer or farther?

You may have noticed that light bends when moving in or out of water (refraction).

The fish is actually deeper so aim down.

Trigonometry calculates exactly.



e. If I walk the Alaskan tundra or any other open plains and find myself with limited visibility between low hills, walk uphill. It is harder, but you get visibility from height which could show you the best trail. Also, once in a while, look behind you. The trail looks different than when you came at it, and it could save your butt from getting lost in the first place. Like reading a map of the area before you even start.

If I walk into a moderate or heavy forest with no trail, how will I find my way out? Take a compass. Look where it is pointing when you start. Explore in a straight line at a constant speed and write the compass reading down for how long before you had to change direction. After several direction changes, you have lost sight of the way out. Look at what you wrote down. Then reverse it to get out. For example:

Walk due north 5 minutes. east 7 minutes. northeast 10^0 for 3 minutes. To get out,

Walk due south west 10^0 for 3 minutes, west 7 minutes, south 5 minutes.

Without a compass, you can still find your way if the sun is shining. Look where the sun is to your body's sides, left or right, and how much. To go back, put the sun on the opposite side of your body. The sun does move up then down along the day, so it will not be exact, but it may be close enough to save you from going completely wrong deeper into the forest. Sailors learned to use stars at night the same way.

If following a winding trail that splits, grab some sticks and lay them across the trail you did not take to mark your way for the trip back.

f. If I walk a long way through Manhattan streets, how do I get back?

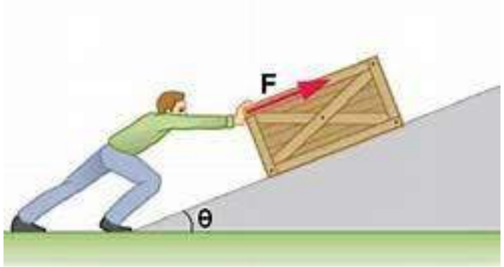
The same techniques above can be used if on foot in a large city. Big enough cities like New York have numbered streets and avenues instead of names. The streets run east and west, the avenues north and south. Pay attention!

g. If I can only push 20kg, what ramp length do I need for getting 40kg into a 1.5m high truck?

A ramp forms a triangle called an inclined plane.

People have used them for centuries.

Solve with trigonometry.



Draw a triangle, where the height to the floor of the truck is the tall side. You need to cut the 40 kg weight in half to 20 lbs or less, so use the trigonometric function sin(angle) = opposite/hypotenuse.

Then walk away from the truck until the angle of the ramp is that size. Make your ramp long enough.

h. If I want to sink the 8-ball in the corner pocket, where do I hit it?

In two dimensions of a pool table top, the action vector equals the opposite reaction vector. Look at the line the 8-ball makes to the pocket. The opposite side of the 8-ball is where you must hit it. Aim your pool stick (cue) to line up to that point on the 8-ball. A steady hand will win.

i. Estimation is often all you need to be in the right ballpark.

Not everything is necessary to calculate exactly. If you remember the following conversions, great:

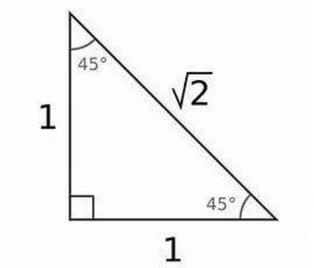
28.4 gms = 1 oz 1.6 km = 1 mile $C = 5/9 (F - 32)$

The temperature conversion is harder to do in your head, but you can still estimate enough to serve you by remembering this - Water freezes at 0 C or 32 F

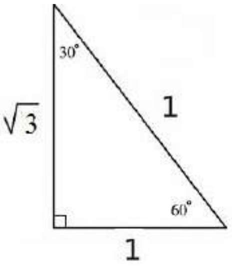
Room temperature = 22 C or 72 F

Water boils at 100 C or 212 F …and estimate from there.

Estimation of related distances: You saw how useful trigonometric functions are above, but what if you don't have the tables or a calculator? For many occasions, you can use the following standard triangles if you can see the problem using one with a 90-degree angle:



45-45-90 angles = 1, 1,$\sqrt{2}$



30-60-90 angles = 1, 2, $\sqrt{3}$

j. Lost on the ocean and just spotted land. How far away is it?

Knowing the diameter of the Earth and its curvature, and assuming you are standing X ft above the water, scientists give you an easy rule to remember the next time you climb a mast:

Eyes at 5m = 250 km away 10m = 357 km away 20 m = 500 km away

Generally, an average adult can see 4.5 kilometers (2.8 miles) at sea level.

k. Using more math than above, a boat can find the distance to the shore from a point in the sea using the sun. Study how to use a sextant and a good timepiece (marine chronometer). Or use the position of the stars at night.

l. Two kids sit on a seesaw; how much do you have to weigh to balance them?

With the fulcrum (balance point) in the middle, the same weight on each side will balance. If the weights are not an equal distance from the center, you can use this equation:

Weight on left * distance from center = weight on right * distance from center.

So a parent at 60kg has to sit 1 m away = a 30kg kid at 2 m

m. If turning a small doorknob or a narrow rod for a curtain is too difficult, adding diameter to it will make it easier. Circumference is 2 * pi * radius, so make it bigger. With a larger circumference, for the same amount of work, you work less hard per inch, and the knob or rod turns. I stick golf balls on the ends of my thin curtain rods and use big doorknobs!

n. LOGIC CHALLENGE: three missionaries and three wolves but the boat only holds 2.

This is a generalization problem to finding a workable set of states to achieve your final state: how to get there from here without getting eaten. For all problems, there are **math limitations**. In this one:

- Must have 1 but no more than 2 in a boat at a time
- Cannot have more wolves than people on either side or people get eaten

If you can add 1+2 to get 3, and know what is bigger 1, 2, or 3, you know enough math to solve this. If you can solve this, you can solve a lot of things that look impossible to figure out. This one is solved by the math technique called 'brute force'.

For the boat problem, there are only 3 possibilities to start within the *limitations*: Two of three moves will become a dead end where you then have to stop or bring you back to the first state. Follow the third path, avoiding what are dead ends or ends in loops. What is left as you proceed is the route to success. Computer programs are written to optimize this to find the fastest, but in life, it is often enough just not to get eaten! This solution has 6 steps. You can see a dozen short videos under the title "The Missionaries and the Cannibals".

1 man 1 wolf goes across, 1 man returns.

2 wolves go, 1 wolf returns

2 men go, 1 man 1 wolf return

2 men go, 1 wolf returns

2 wolves go, 1 wolf returns

2 wolves go. DONE

This generalized problem is used to train everyone from computer programmers to trucking dispatchers. It teaches you not to just jump into a complex situation and start reacting. First, identify what are the *limiting conditions*. To a person not a mathematician, that means what are *deal breakers*. (i.e. never more wolves than men) List them for whatever project or mission you are working on. Second, list the known quantities you have to work with. Money. Time. People. Wolves. Credits to get your college degree. Whatever.

All of the above problems are math you can do. Math that matters. And you will know how when you need it. Beyond these examples, on many problems you will face in life, use what you know to figure out how to figure it out. That comes first. See the problem. Then see the final state or condition clearly.

Then figure out how math can help you get to that state. It may be a fixed equation like the painting problem above, or your solution may be found on a statistical curve of the most likely outcomes. Somewhere, someone smart has made a science of whatever you want to know. Opinion is smoke on the wind. When someone gives an opinion, ask what are the *numbers* and what are the *limitations* where their solution is true. If they can’t tell you, walk away!

Numbers are a friend you can rely upon.

6 Feel The Universe

Perspective is a funny thing. Humans are notoriously full of themselves when they compare what they know of the universe, and what they CAN know, compared to other animals. Unfortunately, it is just ego. Without math, humans have a ridiculously hard time understanding even the most basic truths of the universe. Size. Distance. Things we take for granted in everyday life on our tiny planet. Let's see if you can stretch human perception to get a grip on the truth of universal distances.

An angstrom is 10^{-8} meters. A hydrogen nucleus is 10^{-6} angstroms. Where can its electron be found?

Up to 0.5 angstroms away. All atoms are mostly empty space.

For perspective, if the nucleus is the size of a ping pong ball, the electron goes out as far as 6.2 mi

If a basketball is the 8,000 mi diameter Earth, how far away is the moon? 23.4 feet.

If a basketball is, again, the Earth, how high up does the 60 mi atmosphere go? 0.078 inches, which is thinner than the skin of an orange.

If a basketball is the Earth, how large is the sun? 107 feet in diameter.

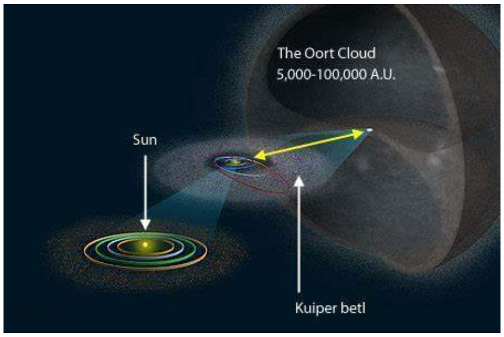
From our sun. the first planet Mercury, we on Earth, and the last Neptune are this far away:

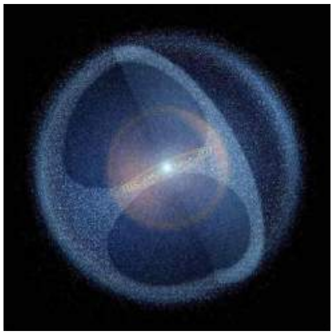
30 million miles	Mercury	3 min 13-sec light speed
93 million miles	Earth	8 min 20-sec light speed
2,790 million miles	Neptune	4 hrs 10-sec light speed

If a basketball is the sun, the Earth is a 2mm bead.

Where does the Kuiper belt of rocks and debris begin and end? Voyager 1,2 are passing there now.

Here are images showing our entire solar system: Sun, Kuiper Belt, and Oort Cloud.





On this scale, you cannot even see the planets. The outer Oort Cloud has a structure as shown.

Our solar system cannot be seen in any image of our Milky Way galaxy, which is 100,000 light-years across. The Milky Way galaxy is a dot in an image of the Laniakea super-cluster of galaxies.

If an apple is magnified to the size of the Earth, the atoms in the apple would be the size of the original apple.

Sometimes, people who know very little science, or very little about astronomy in particular, shy away from knowing more. Some have said it makes them feel small, unimportant, and they don't want to feel that way. Here's a test:

Draw a dot of your house and the neighbors in a circle out to where the school is.

That is now a dot in the entire state. How big is your state on a globe of the Earth?

Make a dot of the Earth, and draw the sun and inner 3 planets.

Make the sun a dot and draw the 8 planets, Kuiper Belt, and Oort Cloud of the solar system.

Make the solar system a dot and draw the Milky Way Galaxy.

Make the Milky Way a dot and draw the Laniakea supercluster.

Make the Laniakea supercluster a point and draw the entire visible Universe.

Does this make you feel small? I don't. I am here to tell you that knowing the actual scale of the universe makes me feel large. Here's why:

Given this enormous universe, do you know where the atoms that make up your body come from? From collapsing gas and energy we got the first stars. The explosion of first-generation stars gave us Helium, then a few of the lighter elements like Lithium and Carbon fusing in the core of those stars. During the explosion of those and later stars, heavier elements all the way up to lead and uranium are formed.

Our sun is a third-generation star. Third. The planets, asteroids, and comets are all made of the same material which came out of stellar explosions. So is Earth. So are we. We are star stuff. We are made of the same goods as the entire magnificent enormous universe.

What are the top 4 highest atoms with the highest percentage in our bodies?

Hydrogen, Oxygen, Carbon, Nitrogen

What are the top 5 atoms that make the universe?

Hydrogen, Oxygen, Carbon, Nitrogen plus inert Helium make up most of the universe.

We are special. We are magnificent to be the result of that chain of immense events. You are made of star stuff. Still feel small in the light of science? Not me.

How about biology? You are all old enough to know where babies come from. A man gives sperm to a woman, and one of them fertilizes her egg. Do you know how many sperm are trying to get to that egg every time? From 250,000 up to 1 million. And only one made it. One! Think of the odds. Every one of us in this room is a winner. A big winner against bigger odds than you will likely ever face in your life again unless you play the lottery or want to be President. We are each special. Remember that.

And remember, you are made of star stuff. Even you twins!

5/3
"I told you not to fly so low over Earth.
JONNY HAWKINS

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7 Hacks For Home And Yurt

I hope one day they bring 'Home Economics' courses back to public schools. It will not teach you the thousands of little hacks that make life better, any more than this chapter will, but it will provide a foundation so you will not be afraid to try. Perhaps you thought to yourself that once you know how to read and write and change money while shopping, so little schooling is actually useful especially compared to the time spent learning it all. Perhaps just for grades to get even more near useless schooling?

Today is for you. At the end of a day or two on this, I will have only one question: Given the time spent to learn what you are about to learn, was this chapter well spent compared to regular schooling? I am an old guy who has owned his own home, lived in apartments, by himself and with a variety of girlfriends or wives. Let me share with you a few things I learned by doing or from watching contractors who do these kinds of things for a living.

-Using toothpicks to fix loose cabinet handles. I recommend that you remove the handle, insert a toothpick or three into the screw holes to make it narrower, then reattach the handles for a secure fit.

-Use pool noodles to block big air gaps under your outer doors. Cut in half lengthwise and slip it under a door. Easy to place and remove. Look online for infrared photos of a house to see how heat leaks out: doors and windows glow! Air is costly to cool or heat so save it. Noodles are cheap & last.

-To seal narrow gaps around windows and door frames beeswax is an excellent tool to prevent drafts and improve insulation. Blocks of wax bars come in packs of two or four, so you'll always have more than enough on hand. What else do you have handy that works?

-Caulk erodes over time, which can make your space look like it's in disrepair, no matter how recently you've redecorated or cleaned. Bathrooms. Baseboards. Resealing with fresh caulk not only protects your home from moisture damage and bugs but also gives your rooms a polished, high-end look. It comes in a squeeze tube like toothpaste and goes on with your finger. Well worth it.

-You can improve the air quality of any room with a couple of live plants — plus, your space will look more beautiful. If you plan to have some indoor plants, check the NASA website for plants that clean the air, give a lot of oxygen, absorb benzene and formaldehyde from building products, and others they use on space stations.

-Using paint pens for quick & easy touch-ups. Their small brush top helps you work meticulously to touch up any scratches or marks that are messing up the vibe of your beautiful space. Wood versions called stain works great as well & are so much cheaper than throwing out solid but old-looking items.

-Add cornices on ceilings & walls to hide imperfections. Another trick is to corner metal beads between terminations. These inserts help conceal corners that would otherwise look messy.

-Make sure your gutters are clear to prevent roof damage. Get a scoop, rake, brush, wand, or other products under $50 made to help clean out your gutters. Regularly clearing out your gutters is important for maintaining your roof, since clogged gutters can lead to water pooling on your roof and damage, so take steps to prevent expensive repairs by keeping your gutters clean. Like changing oil in a car, preventive maintenance saves you money.

-Invest in a handheld butane torch for small repairs & touch-ups. A handheld is a great tool to have if you're up against small welding jobs, and they can melt stuff, cut difficult-to-cut items, and even remove paint. It’s easy to use, even for beginners, and usually comes with an accessory kit that opens up a realm of home improvement possibilities. It’s not just for crafters and hobbyists.

-Cleaning oil spills from clothing with a coffee filter. Oil that spills on your clothes can ruin a beloved outfit, but it doesn’t have to. I advise that if an accident strikes, you should place a coffee filter over the wet stain and press down. The coffee filter will absorb a lot of the oil. Then, wash your clothes as usual.

-Cord Cover walls and tubes. Use cable clips, cord covers, or cable sleeves to keep cords and cables organized and hidden from view. When your cords are taken care of, your house will have more of a clean feel. This cord cover for your wall fits several feet at a time to help you keep track of all your wires. Excellent for mounted televisions, many come with a pre-applied adhesive tape that's unbelievably strong. That said, you can also install with drywall anchors and screws, depending on your application preferences.

-Brighten dim spaces by hanging small mirrors around your home. Since mirrors reflect light, you can use this method to increase the impact of both natural and artificial light in your indoor spaces. It's an especially great option for entryways and makes your room look larger.

-Use a low-flow showerhead to save water. Easy to save both water and money.

-Switch to newer LED bulbs around the home. Some LED bulbs on the market are now equipped with smart technology that lets you control their color and brightness at the touch of a button. Some are also voice-activated, so you can use them in conjunction with Amazon Echo and Google Assistant for illumination that’s super easy to customize.

-I recommend reducing your energy use by plugging your electronics into energy-efficient power strips, which helps by preventing “phantom energy consumption.” Even when not in use, a plugged-in device can draw power. Strips can charge all your devices at once, and they provide surge protection. Plus, you can disable different outlets based on which ones you’re using at any given moment, which can reduce your electricity bill.

-Rusty tools: This hack works by utilizing the acid in these substances to dissolve the oxide on the metal. The first step is using soapy water to eliminate any grease that might be on the surface of the metal objects being cleaned. I have had success using both ketchup and vinegar. When using vinegar (cheap), put the item you are cleaning in a container and submerge it in the liquid. When using ketchup (pretty cheap), simply coat a little on a surface and cover. Either way, let the items soak for between four and six hours. After the items have soaked, just add baking soda to water and clean the items to neutralize the acid. The result should be an item (mostly) clean of rust and with a new lease on life. This helps eliminate the use of retail rust removers, which often contain toxic chemicals that are harmful to the environment. Using creative, nontoxic solutions to extend the life span of everyday items can significantly reduce the amount of waste produced by day-to-day activities.

-Using vinegar as a natural way to terminate invasive growth in your garden. I use a mixture of vinegar, salt, and water for those stubborn plants that just keep coming back. Simply put the mixture in a spray bottle and spray it directly on the plant you want to get rid of.

-If your freezer is full of food, there's less surrounding air that needs to be cooled, which lowers your electric bill. Put solid blocks inside until you need the room for actual frozen food. Also, if electric power goes out in your area often and you travel, don't guess if your food went bad. Place a tiny cup of frozen water with a quarter laid on top in your freezer. If you lose power long enough to spoil food, the quarter will sink!

-Anyone try to remove a stripped screw? Before you give up and do something drastic, I recommend using a rubber band, which is quite simple. Place a wide rubber band over the screw head and use your screwdriver or drill to twist it out. This added traction can make all the difference. Get the ones not made out of latex for those of you who are allergic.

-Are your outdoor stairs particularly slippery? Add traction the next time you paint them by mixing sand with exterior paint and applying it to the steps. A pound or two of sand can add grip and traction to any stairs around your home for maximum safety, whatever the weather may be.

-Opt for baking soda instead of a toxic chemical when it's time to clean your oven. If you don't clean it often (like me), it can get pretty bad, or when you first move into an apartment. Just sprinkle baking soda all over the bottom of your oven. Then, add a little bit of water to create a paste. Let the paste sit overnight. The next morning, wipe the paste away with a damp sponge. It's safer for you, your skin, and the next meal you cook than using heavy chemicals.

-Beer goes bad. If you have really old beer, or just broke up with a beer lover and don't drink it yourself, you can use it to fertilize your lawn. The sugars in beer stimulate beneficial microorganisms in the soil, which helps the grass and flowers grow. Just mix a can of beer with a gallon of water and apply it to your lawn.

-In this century of electronic devices fix frayed cords on chargers with *liquid electrician tape*. I know how annoying – and unsafe - it is to use phone or laptop chargers that are fraying at the edges. Instead of tossing them, try some liquid electrician tape to repair them. As long as the copper wire is still in good shape, it's a quick and easy repair that saves you money. This particular tape is made of a rubber-based material that won't harden or calcify over time.

So did you learn anything today you might use in real life?

The preceding is for this 21st century in America, and you will pick up lots more if you keep your eyes open. But what about the rest of the non-industrial planet? What about America if things start to circle the drain? Greece fell apart. Rome fell. Europe and Britain were superpowers once. There are old skills I've learned both for joy and for just in case! You can too.

-Can you start a fire? I don't mean with a ton of lighter fluid. Carry the gear in your pocket and skill in your head when you walk in the woods.

-Tanning an animal hide is not too difficult of a task, but only those skilled in the art can scrap all of the fat off of the hide without tearing it. In days gone by, people used to use hides for clothing, blankets, floor coverings, and even for shelter.

-Folks knit their own clothes, which was integral for keeping warm or for trade. They could knit things like socks, hats, sweaters, and more. Mom could sew. Sis could crochet.

-The process of candle-making from beeswax and animal fats is a skill that was passed down through generations but may soon be forgotten. Until the lights go out.

-Keep a fire extinguisher in the kitchen but no so close to the stove that you can't get to it in an emergency. And while you are checking that it works, text the batteries in your smoke alarms: the larger the house, the more alarms you should have.

-You can't "park" your horse or oxen like a car and forget about it for days. They need to be properly cared for so that they stay strong and live long.

-In times past, food preservation techniques such as smoking, salting, and drying played a crucial role in extending the shelf life of food. These methods were vital for ensuring a stable food supply, particularly in seasons when fresh produce was scarce.

-A good knife can be used for cutting, hunting, food preparation, and even self-defense. People still use bone, wood, bronze, iron, copper, or brass and use them every day. I am never without one. A decent bow & arrow set is often the difference between life and death. As is making a spear and net for catching fish using your own line from roots, and hooks from bone.

Because I've done all these things I am unafraid to try anything else that comes up.

8 Handy First Aid

The skin is the largest organ in the human body. Inside it is framed by 206 bones made mostly of calcium. A set of connecting muscles, ligaments, and tendons anchor it all together, giving the organs a nice warm home. Being warm-blooded animals, the food we eat maintains an internal temperature independent of the outside air temperature (within limits), allowing us to be active when cold-blooded reptiles must sleep. A body grows from the union of sperm and egg into millions of cells following the blueprint of DNA.

First aid for a body is just that. The aid or help given right away before professionals get there. Always call a professional for any serious injury. A First Aid Kit should be kept in every home, a good idea even in a car. Recommended contents: pcv gloves, crepe bandage (sticks to itself), scissors, cotton swabs, tongue depressors, cold compress, cotton balls, metal tweezers, adhesive band-aid, alcohol cleaning pad, aspirin, a basic first aid manual, a tube of bacitracin, petroleum jelly, a USB spare power pack for phones and devices, and a short list of emergency phone numbers with the allergies & blood types of family members. Eight common blood types: A positive, A negative, B positive, B negative, O positive, O negative, AB positive and AB negative. People with O-negative blood type are considered universal donors used in emergencies for transfusions to anyone.

What blood type are you? Who can you give blood to? Who can give it to you? Know this like you know your birthday! And look at what others keep in their first aid kits.

Did you know aspirin comes from a plant? People found long ago that when they chewed on the leaves, it relieved headaches. It is also great to give an aspirin – just one - to a person having a heart attack, to relax the heart muscle, thin the blood, and reduce stroke damage, perhaps saving their life. Oil of clove used for toothaches is also from a plant. Many others as well, and worth knowing.

Did you know penicillin – the parent of most modern antibiotics – was first found on moldy bread? People found long ago that a bad infection from a cut could kill you, so they might give the old bread to them since they were not likely to live anyway. Then someone noticed the ones who ate a certain kind of moldy bread fought off infection!

Did you know that someone who appears drowned can sometimes be revived if CPR is performed in time? Does anyone know what CPR is? Cardio Pulmonary Resuscitation. There are classes given by professionals on how to do it. If you get the chance, take one. They are usually free. Even watching the 5 minute YouTube video is better than nothing. 4,000 people a year die of drowning. How many could have been saved I wonder.

Do you know the first signs of a heart attack? The pain on the left side of the chest, down the left arm (the side the heart is on), and trouble breathing? Call 911 and make them sit down immediately, even on the ground. And maybe have them pop an aspirin!

If someone is bleeding badly, your first call is 911, sure. Immediately do what you can to apply pressure to the wound. Pressure stops or slows the bleeding. It may just keep them alive until the ambulance gets there. And if they let you watch what they do first, and next, and next.

Did you know that if you pee a lot, you lose vital potassium, so eat something like a banana and replenish that potassium? There are lots of things we need and lots of foods that are best at giving them to us. Learn what they are!

Did you know that children who sleep 6-8 hours a night grow taller, stronger, smarter, and have better skin & hair? Exercise is great for health, as the human body is a machine which can grow more beautiful as you use it. But a good night's rest is the other side of that math equation. Especially for your brain. Those of you who are really smart, don't ignore your strength. Those of you who are really strong or fast, don't ignore your brain.

Do you know that for a hospital patient whose bed is near a window, their recovery takes a much shorter time?

Did you know a toilet has 400 times more bacteria than a single seat elsewhere?

Did you know the surface of the Earth is 2/3 covered with water? Learn to swim! Even badly is better than nothing. Designate a pool-watcher at a pool party. Drowning is not like in the movies: little wild thrashing, no screaming. Their head is usually tilted back, eyes wide, trying slower & slower to keep their head above water. If you see this: A - yell for any nearby help. B - throw a line or something that floats. If offered a course in mouth-to-mouth resuscitation, take it!

What is the average lifespan in America today? 77.5 years. In 1900? 47.3 years. Why? Science is why: better medicines, better vaccines, more food, cooling in summer and heating in winter.

BASIC FIRST AID:

If you don't know what to do, call for help, and don't make it worse.

Assess the scene - if it is unsafe to be there *Get Out Of The Way*.

Do not move a badly injured person unless no choice.

BASIC MISTAKES:

-for a nose bleed do not tilt heads back. Apply a steady pinch to nose & breathe through mouth.

-for a fainted person do not sit them up; leave on ground but raise legs 8" - 12"

-putting heat on a fracture is bad; use ice instead

-if step on broken glass or debris; do not try to remove shards. Must use a clean sterile tool

-do not raise a broken leg, it can cause gangrene.

-if shards in an eye, do not keep it open. Close that eye then put gauze over it and goto a pro

-run burns under cool water for 20 minutes not just a few seconds to reach deep tissue

-for choking do not go straight into Heimlich. Strike the back first 5 times with heel and look.

- in a seizure do not put something in the mouth or use hard restraints; place on their side and clean the area of objects

- in a heart attack do NOT prioritize mouth-to-mouth; use chest compressions more often as it helps circulate blood and air better

-Remember CPR is done with head straight, tilted back, & chin up.

-a tourniquet stops all blood flow so instead apply downward pressure if bleeding bad. Only use a tourniquet if a limb is cut off or close to it.

-a sprained ankle – don't move a lot; if a boot is above ankle leave in place. Remove a shoe. Apply elastic bandage wrapped tight top to bottom then back up; tuck end under last strip. Check blood flow by pressing toenails.

Some are never too young to learn the following:

CUTS & GRAZES – Raise the wound, clean and dry, and apply a sterile gauze.

BLEEDING CUTS - running water to clean the wound, hydrogen peroxide to disinfect, apply pressure.

NOSE BLEED – Tilt head slightly forward, pinch nose, breath through mouth.

HEAVY BLEEDING - expose injured area to inspect; then pressure; sterile gauze/dressing, keep talking to them, dressing not too tight.

FOOD POISONING - If vomiting, allow to continue; sip water, lie down on side. If no help coming, sip some water with baking soda.

BURNS - running water for 20 minutes. If help far away, can use toothpaste or oil covering as ointment.

ON FIRE - stop a person from running; roll them on ground and wrap in anything to cut off oxygen to fire.

BONE FRACTURE - not punching skin = closed; puncture = open. Look for swelling & bruising, bent or twisted, or a grating noise. Support injured part to immobilize, use padding, apply pressure around, not over the bone. Don't move. Sling an arm. Secure leg to uninjured leg but do not raise.

UNCONCIOUS - check for blood & breathing; Pulse? Put on gloves & frisk head & body to the toes. Loosen a belt; loosen shoe laces. Then place the closest hand up to head level, furthest hand against opposite cheek, bend far knee up, then roll towards you onto their side. Re-check breathing and pulse.

BREATHING STOPS - roll onto back and **start CPR if you are trained**. A quick 10 seconds, then check pulse. If still no pulse, 30 compressions + 2 mouth vents to rise chest; repeat until help arrives.

CHILD OR INFANT CHOKING - up to 5 back slaps, then on side & look. If not then gentle chest thrust. Repeat. Do not use CPR unless trained.

What Do You Know?

Q- In 2000, how many women in America died every year in childbirth? 19 in every 100,000.

In 1900, 700 women in America died in every 100,000.

Q- In 2000, how long does it take to fly from NY to a hospital in California? 6 hours. Or 41 hours non-stop by car. In 1900, it took 45 days by ship through the Panama Canal.

In 1850, it took 200 days to get from NY to California by ship around South America.

In 1900, most Americans washed clothes by hand and carried water into the home. In 2000, almost no one did, as plumbing brought water right into the home for whatever use. Wasteful but mostly clean.

In 1900, nighttime in America was a time of rest, and reading if you had a candle. In 2000, almost every American had electric lights in their home to continue whatever activities they needed or wanted. But people got needed sleep easier in 1900.

In 1900, to talk to someone on the other side of the country who might save their butts took a letter months. By 2000, you called/texted by phone or went on the internet in a matter of moments. Reach out to those who might need your strength to do what they cannot.

Q- Did you know the geneticists found they can turn off different genes causing different things? How long can people live if the geneticists turn off aging in our genes? 115-125 years is estimated. More genetic improvements are coming.

America spends more per person on healthcare than any other developed country, but many people lack access to the services and treatments they need. The addiction crisis has gotten continuously worse since 1999, and more than 1 million people have died of a drug overdose this century. Healthcare worries mean lack of confidence to solve all problems if government can't even keep us healthy or people agree that vaccines are good.

When hurricane or tornado or other emergency coming, make certain your disaster kit has the following: battery power & crank power flashlight, battery & crank radio, usb power pack for cell, water, weapons, first aid kit. Also, remember to top off your gas tank as gas stations are the first businesses to close or be overwhelmed.

Who can guess what life will be like in 2100, with A.I. growing, the population shrinking, and social media replacing personal interactions? (talk about it loosely, perhaps write an essay).

9 On Robotics

The science of robotics includes everything from smart cars, automated factory machines, and military drones to raw artificial general intelligence (AGI). AGI promises the integration of robotic android bodies with sentient machines. Conscious like us organics? No, clearly not. But smart and aware of their environment in their own way. They have already begun to replicate code for themselves. If you see a video of an automated car factory, you know that producing a body to go with a sentient robotic mind is not far behind. Check out Sara, designed to avoid discussing sex or politics, but is bilingual, speaking both Arabic and English. Or Ameca. Or Sophia who has Saudi Arabian citizenship. Don't even start me on the Japanese companion bots.

A little history. If they taught this when I was in school I would find history a lot less dull.

In ancient Greece over 2000 years ago, there were rudimentary machines that were made to look like people or animals. No intelligence at all, working like puppets using wheels and gears and pulleys. Until the age of industrialization in the 18th and 19th centuries, little progress was made.

Babbage created a complex calculator eleven feet long made of 8,000 parts for figuring out simple math problems. In 1843, the mathematician Ada Lovelace created the first software logic for a mechanical brain. It stayed on paper until the 20th century.

Yet the idea of mechanical 'people' always captured the imagination. In 1872, the growth of machinery in society prompted Butler to warn, "There is no security against the ultimate development of mechanical consciousness; in the fact that machines possess little consciousness now, there should be no comfort."

The logic of mechanical thought was becoming slowly clearer. Two binary states, 0 and 1, could be used by mathematicians to describe every logic they could imagine if only the cumbersome algorithms could be replicated faster. Enter the invention of the vacuum tube in 1904 and the transistor in 1947. Calculating machines like ENIAC were created from the Manhattan Project to help with producing the first nuclear weapons. Seeing how machines could leverage human abilities, other vacuum tube and transistor-driven devices were designed and built in the 1950s.

The invention of the quantum semiconductor in 1958, which could pack thousands of transistors onto a single chip, changed the progress dramatically. For example, reducing a problem to simple math and logic began to employ binary tools like PLUS and MINUS algorithms, using AND and OR gates for logic.

Information was referred to as data, measured as 8 bits of [0 or 1] data = 1 byte, 1 million bytes = 1 Meg, 1000 Meg = 1 Gig, etc.

Folks originally thought brute force would eventually wake up. Build a big enough brain, a complex enough machine as measured by how fast it could work or how many tubes, transistors, or silicon chips it contained and intelligence would surely result. Like the 'Forbin Project' movie.

Wrong.

The mainframe computers of the 1960s were clever and expensive and gave us the ability to go the to moon and to build commercial nuclear plants. The Cray was king. The IBM 360 awesome. But not self-aware. Not involved with its environment. Not able to take care of itself. Feed or maintain itself. Reproduce. And not having goals that it pursued using environmental feedback and planning and increasing experience with time. They were brute force: If this – then that - else the next thing.

Serious work in the late 60's and early 70's centered on 'expert systems' and neural networks. Enter 1980's genetic algorithms. Not one big program anymore, but programming written in pieces for specific functions. But they weren't alive. Insect NEMS bots showed how much life could be simulated without thinking. Unlike organic humans, more than two parents have been tried and worked. Kids can try the El-Fish and Maxis games themselves and see evolution in action by combining code.

Even these never woke up. Never perceived their environment enough and made enough choices based on it. That's what we do. That's what all organic life does, down to the lowest insect. BTW, insects like colonies of bees have some of the strongest logic algorithms and sensors.

During years of combining fixed algorithms of [0,1] logic with neural nets, we saw chip speeds and capabilities rapidly improve under Mohr's Law. It states the processing power of chips doubles every 18 months or so. For comparison, our human wiring changes substantially once every few million years. The math says they will soon catch up and pass us, much as Butler predicted.

Oddly, we still don't fully understand how neural networks make decisions. AI-powered tools are now in everyday life. Banks use them to approve loans. Hospitals use them to analyze medical data, such as X-rays and MRIs. Companies use them to screen job applicants.

In 1997, a computer beat the world's chess champion. In 2016, another beat the world GO champion. It is no longer even close. But these are specialists, not general thinking creatures. And not mobile in android bodies walking among men - yet. Nor can they reproduce their own kind - yet.

The latest major change came in 2019 with the advent of general machines. These were aware of their surroundings, could receive input – not just from programmers & mathematicians – and find information on the internet for us at frightening speeds. Even draw conclusions. Many verbal assistants to help us are now common, like Alexa, SIRI, ChatGPT4, CoPilot and others.

The traditional 'Turing test' and its modifications since the 1950s are the core metric: 2 beings are separated visually. Use a telephone or a text-only keyboard. If you are one of the beings, how long will a question and answer session take you to determine whether the other being is human or a robot? If they are not both intelligent, it's quickly done as with the early weak AI systems using languages like LISP and PROLOG. Not so anymore. New machines like ChatGPT4 can pass these tests, but are admittedly not sentient.

List a few things machines are better at than us. Just dumb machines without brains at all:

-cars move faster
-airplanes fly
-trucks carry heavier loads
-calculators do simple math up to trigonometry
-can openers open cans

Now list things smart machines are better at:

-Playing chess – they can beat any human -Playing GO – they can beat any human
-transmit information at over a million bits/sec whereas human speech is limited to 39 bits/sec.
-interface directly with physically powerful machines (cars, construction equipment, drones)
-walk in our world with a head, arms, and legs to use tools we use (NASA Robonauts)
-perform delicate surgery on people without shaky hands & poor human vision
-live easily in outer space needing only electricity and spare parts (we need bulky food & water)

Who can list things people are better at than smart machines?

-envision something that has never before existed.
-create something that has never before existed, though if a human envisions it, robotics are getting good at creating it.
-program a robot, android, or artificial intelligence creature, although computers now do certain levels of complex programming of themselves.
-make beautiful art, although AI systems are getting very good at it and few humans can.
-write a wonderful novel or screenplay, although they are getting so good the Actors Guild went on strike in 2023 to stop them from taking over movies and TV shows
-make live artistic or interpretive theater performances in motion and voice, although they are getting better at that as well. Have you seen the Boston Dynamic robots run and jump and, yes, dance?

What can you do? The best in each of us better get busy if we are to have a future of our own!

A WORD OF CAUTION TO THOSE WHO THINK TECHNOLOGY MUST ADVANCE FOR YOUR BENEFIT:

To build the atomic bomb, in a two year period they consumed 10% of the electrical production of the entire United States. Once full sentience is reached, do you honestly think any industrial nation will say it's too much & let the other nations have it? Copper was in short supply for electromagnetic separation of U, so the project borrowed 15,000 tons of silver from the US Treasury to wind into coils.

Perception of the truth of history is so grossly missed by the common folk. Protesting even peaceful; uses of nuclear power and chaining themselves to plant fences when I was taking my nuclear degrees. Not listened to by Barnard ballet majors and liberal arts students because I was in a position to know what I was talking about. The entrenched oil and coal utilities publically fought the protesters and privately cheered & funded them, that they might bury nuclear electricity potentially "too cheap to meter". Meanwhile, global warming, air pollution, and ozone destruction rapidly increased from those actions for the next 5 decades.

If you graph human deaths from war, you will see an exponential increase up to 1945 at which point it drops to about a million a year and stays there for the rest of the century. Stop. Think.

Clearly there was a radical break with the psyche of human leaders and their decisions in 1945. Nuclear is the largest force of peace, yet one which may yet destroy the species by destroying the

ability of our planet to sustain us. A.I. loose in the hands of common folk will be as, if not more, significant. A.I. under control of those like the vested powers of the 60s, 70s and 80s who have the most to lose. The common folk are herd creatures; leaders who know better have immense short term power in opposition. Stop. Think.

10 The Periodic Table

Chemistry is the science of how electrons make atoms interact with each other. On the largest scale, a ***mixture*** is just a bunch of material together in one place, not interacting at all. A ***molecule*** is material with similar properties, like water or salt. If you look smaller, you will see molecules are made up of ***atoms***, which themselves have similar properties, such as gold or carbon. These are called fundamental ***elements***. Smaller still each element atom is made of ***electrons, protons, and neutrons***. The electrons orbit around the nucleus formed of protons and neutrons. These orbits are where all the chemistry happens.

If you look smaller than electrons, protons, and neutrons, you have skipped passed the domain of chemistry and entered the science of atomic or nuclear physics.

In the scientific discipline of chemistry, the periodic table of the elements is critical. Elements are ordered by atomic number = the total number of protons in the atomic nucleus. Simple, effective, and perhaps the most powerful tool science has ever developed for the chemical study of, well, everything. The columns are called 'groups', and the rows as 'periods'.

Greeks first used the term 'atom' to describe the smallest, indivisible item which still retained the properties of that item.

Neils Bohr theorized and was correct that even the tiny atom is composed of a nucleus of protons (+ charge), neutrons (0 charge), and orbiting electrons (- charge). Since electrons are negatively charged, they bind to atoms because the nucleus of atoms contains positively charged protons. Why don't they fall in? Much like planets or a weight on a string spun around your head, electrons have too much energy to give in to that attraction and do not fall into a nucleus.

A discovery made by Dmitry I. Mendeleyev in the mid-19th century was that there exists a recurring ***pattern*** he called a "periodic law" in the properties of atoms. Instead of one long list of more and more protons, he cleverly arranged elements into a 2-dimensional table which showed **elements** in the same column (**group**) have similar properties. See the image below.

Initially, the table only expressed the known relationships among the elements. Today, many more properties can be determined using it. Holes in the table identified what an element would be like *before it was discovered*. Remarkable.

There are 92 naturally occurring elements in nature, the remaining up to 118 occur only when synthesized in laboratories or rare natural events. An element is a substance where all the atoms have the same number of protons. All carbon atoms have 6. All oxygen atoms have 8. All uranium atoms, one of the largest, have 92 protons. The number of neutrons may vary, and these are called isotopes. It is still the same element, with the same chemical properties. They have the same chemistry properties since they have the same number of electrons & protons and react chemically in the same way. It all depends on the electrons on the outermost levels of an atom, called 'valence' electrons.

Mendeleev notices that chemically, all the atoms he listed reacted chemically the same way, though with different strengths. Groups 1,2 liked to combine with anything in groups 13 – 17. He also noticed all atoms in group 18 did not combine chemically with anything! The atoms of groups 3-12 got a bit more complicated but it was clear he was onto something. There is a nice YouTube video, *"The Periodic Table Explained"* [3:06]

When two or more atoms combine chemically, the result is called a molecule. Occasionally a molecule is not perfectly balanced electrically and has extra + or – charges. An unbalanced electrical molecule is called an ion.

Who knows what you get when you put together 1 Na and 1 CL? Salt! This is written NaCL

Who knows what we call 1 H and 1 CL? Hydrochloric acid. This is written HCL

> They each have one connection link, either for sharing 1 electron or for wanting 1 electron to be shared. So one atom of each is all that is required to make a molecule of salt or hydrochloric acid. For water, it takes 2 H with one link each and 1 O atom with two links.

You have heard that we ourselves are called 'carbon-based life forms'. This is because carbon, which links 4 times, is a marvelous way to create long chains of molecules all with different properties. Life uses this complexity in various ways:

HOH = water, a liquid at room temp

H2SO4 = sulfuric acid, liquid at room temp

CH4 = methane, a gas at room temp

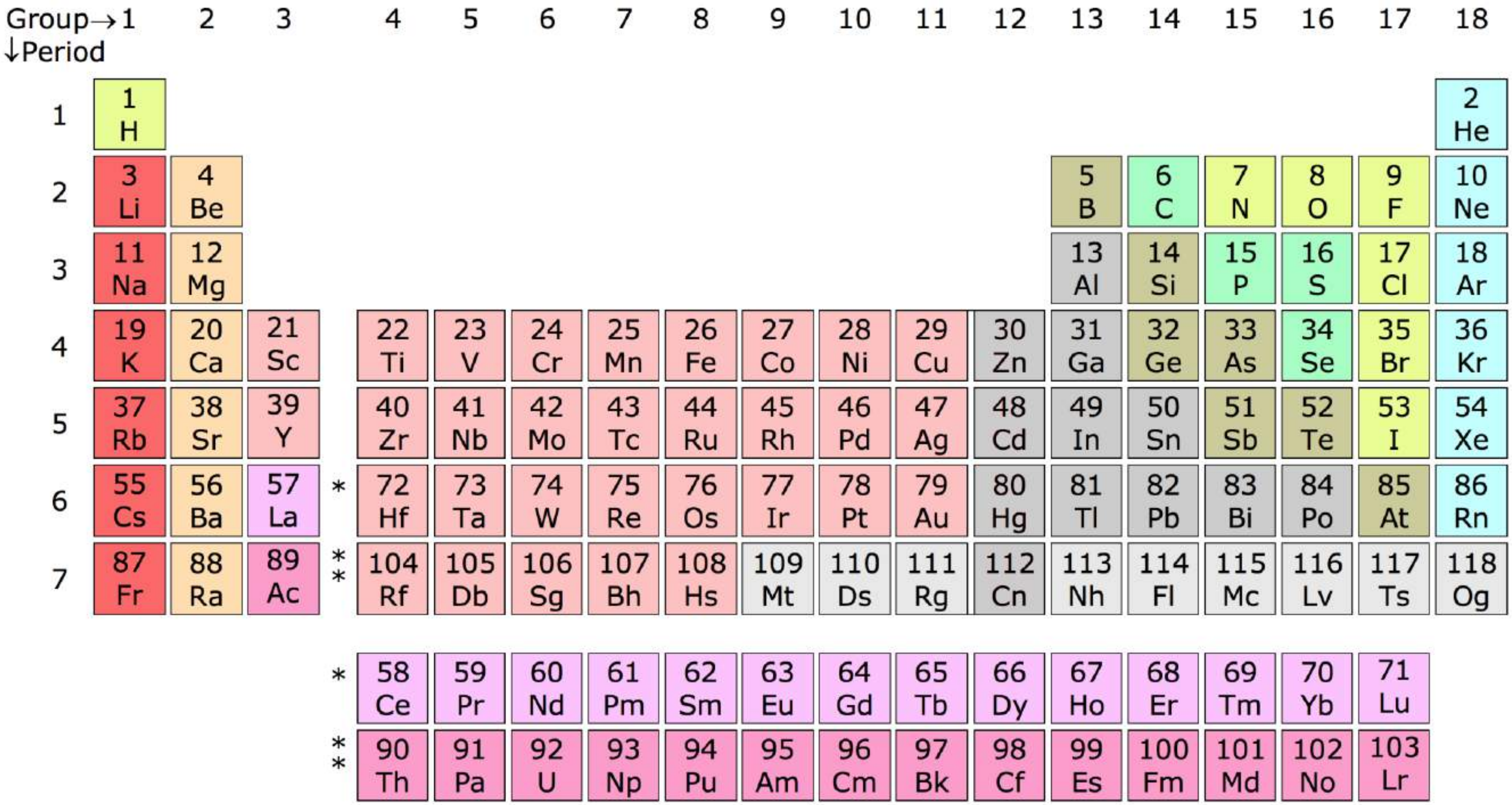
CH3OH = alcohol, a liquid at room temp

Using this knowledge, Mendeleev and those who came after him have predicted which reactions would occur, and what properties the molecule would have. Eventually, the knowledge extended into intentionally combining several atoms and molecules to make new molecules with the properties you wanted.

Properties of interest to chemists and engineers include Ionization Energy, Electron Affinity, Valence and Oxidation states, Electronegativity, and especially Melting and Boiling Points.

To a chemist, everything happens because of the positions of electrons, or groups of electrons, orbiting the nucleus in various collections called 'shells'. Electrons appear to orbit with the first 2 together, then further out the next 8, etc. It is possible to predict the chemical properties of an element if one knows the electron properties at specific temperatures and pressures.

With the advent of quantum understanding of electrons, it becomes more complicated but does not affect the ability of a chemist to use the periodic table to great effect. So while the Periodic Table of Elements may be a story about humanity's chemical ingenuity, it's also a scientific story that's still unfolding in laboratories across the world.



Group→1 ↓Period		2	3		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H																		2 He
2	3 Li	4 Be												5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg												13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc		22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y		40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57 La	*	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89 Ac	**	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og
				*	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
				**	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

11 Correcting Old Knowledge

Knowledge advances. Opinions change and eventually are replaced by facts, but very slowly. You would be amazed how many things taught to your own parents are now known not to be true. If you meet an older person who still believes some of the things below, do not be angry with them or think them stupid. They are ignorant. Do you know the difference between ignorance and stupidity?

Ignorance is being taught something not true. Ignorance can be overcome by being taught or learning it yourself. It is stupidity which goes all the way down to the bone. Beware the stupid.

Let's start with a complicated one.

Gravity. There is no such force as gravity.

Contrary to Newton and common experience on the surface of this planet, gravity is the name we give to a space-time curvature effect to make it look like other forces we know and love, like magnets, hitting a baseball, and positive & negative charges attracting each other. Gravity is not. It is a quantum effect.

Without the math, which is very complex, simply remember this. Space and time are not two separate things – they are two aspects of the same thing, *space-time*. Like electricity and magnetism are two aspects of electromagnetism. The key is that mass bends space-time.

Mass tells space-time how to bend, and space-time tells mass how to move.

For those of you who will never understand or need to understand quantum math, the simplified Newtonian math for gravity will likely serve you very well in your life without ever noticing that you are working with the illusion, not the fact. It just looks like a force, but is only appearance; a side effect of the quantum realm.

The rest of these items are a lot easier to understand without the math (for the most part):

Pluto was the 9th planet. Now we know it is a dwarf. There is a formal definition of planets and Pluto doesn't make it, like a dozen others out past Neptune near the Kuiper Belt. More every year.

> As a consolation to Pluto lovers, in the past Pluto was thought to have no moons. Recent observations have identified multiple tiny moons orbiting Pluto, expanding our understanding.

The Brontosaurus was taught as a distinct dinosaur. Recent research has revealed that the Brontosaurus was a misidentified specimen and is now classified as Apatosaurus. Personally, I liked the old name, though scientifically inaccurate.

Dinosaurs all being scaly lizards of sci-fi movies is a lie. In truth, many had feathers. In later centuries, some of the feathered dinosaurs would evolve into birds.

The idea that humans use only 10% of their brains is a common myth. Modern neuroscience has shown that the entire brain is active, and every part serves a purpose. The myth came from reporters misquoting a scientist in the 1950s who stated his research could only identify *the purpose* of 10% of our brains. The idiot reporters translated this into *we only use 10%*. Remember this in life whenever something is reported to you in the media – or in life by some idiot – for which you can look up the original online. There are many original research pdf files out there free for the reading, instead of taking some reporter or blogs word for what it says.

Since the traditional American alphabet ended with “Z” in the last century, many schools still don’t teach about letters like “Å” and “Æ” used in some European languages, reflecting a more globalized perspective today. You live on this planet. Expand yourself. Learn!

It was once believed that plants didn’t communicate with each other. Current research has revealed intricate signaling and communication among plants, challenging this outdated notion. Especially among vines.

Traditional tongue-taste maps suggest that specific areas of the tongue are responsible for different tastes: sweet, sour, salty, bitter. Scientific advancements have debunked this concept, showing that taste receptors are evenly distributed.

While an asteroid impact is still considered a significant factor in the extinction of the dinosaurs, it’s now understood that volcanic activity also played a crucial role. The dinosaurs lasted 600 million years and were plenty tough. It took a lot to take them out. After the asteroid and the super volcanoes hit around the same time, disease also played a factor.

In the past, we referred to Earth’s moon as “the Moon.” Now, we’ve discovered that Earth has other natural satellites, such as mini-moons or Trojan asteroids. Try calling our big one “Luna”. She deserves it as she levels our spin, controls the ocean tides, and the monthly periods of mammals every 27 days or so. And has caught a lot of asteroids that would have hit Earth without her - just look at photos of the outward side sometimes.

Venus was often called Earth’s “twin” due to its similar size and proximity. However, we now know that Venus has a scorching, inhospitable atmosphere of sulfuric acid today, making it significantly different from Earth. It is hot enough to melt every spaceship sent to the surface in a very short time.

It was once thought that Mercury had a “tidally locked” rotation, meaning one side always faced the sun the way one side of Luna always faced the Earth. However, it has been discovered that Mercury has a 3:2 spin-orbit resonance, allowing it to rotate more dynamically.

While Mount Everest remains Earth’s highest peak above sea level, Hawaii’s Mauna Kea, measured from its base on the ocean floor, surpasses Everest in total height. There are far bigger ones on Mars.

The myth that goldfish have a 3-second memory has been debunked, as research indicates that they can remember and learn from their experiences. Anything that can learn is not stupid.

Water is not a good conductor of electricity in its pure form. It can conduct electricity when impurities or ions are present, challenging the previous teaching that it conducts great. Hard to find very pure water, so the mistake was easy to make.

The Sun was traditionally described as yellow. In reality, the Sun emits white light (all colors together), and its color appears when seen through Earth's atmosphere as a filter. Yellow overhead, and reddish-orange at sunset when the light goes thru more atmosphere at the edge.

Less than a thousand years ago, people thought young women, with cats as pets around the house, were witches because they weren't getting sick during the bubonic plague, or 'the black death'. So they killed cats and young women. This made the problem worse, as cats killed rats which carried fleas which were the actual plague carriers. In Europe, nearly 5 of 6 people got sick or died.

The food pyramid, previously used as a nutritional guide, has been replaced by more dynamic and personalized dietary recommendations, such as the MyPlate model, which reflects updated nutritional knowledge. You would think people knew all about good food by now, but we are still learning. Pay attention as you grow and live a long healthy life. For a simple cookbook, try "*The Recipes of Mary Marino"*, which I have lived by.

The scientific concept of 'causality' is central to the scientific method. A cause happens, then the effect. Like the laws of Newton, the scientific method is limited. Causality itself fails in the quantum realm. Check my essay on '*Quantum Magic 101*'.

As a final note, sometimes old knowledge is not wrong, just incomplete. Take a 15 year old boy who studied that the Mayan civilization built pyramids and were into astronomy, naming many stars into constellations. Looking at a map of Mayan cities, he wondered. He looks at sky maps over them and found the dozen Mayan cities seemed built by them just where stars were. He theorized they used the positions of constellations to mark positions where they built cities. Except one bright star had no known city. He read Google Maps then reported this. An expedition to the area found another Mayan pyramid and city just where he said it would be. He was 15. He followed the scientific method to a logical conclusion and was confirmed when a team of archeologists looked.

A note on where we are this century: Technological innovations mean that governments and law enforcement organizations can monitor personal communications and activities more easily. There have also been political pressures on the freedom of the press due to significant increases in fake news accusations, which have undermined the trust society has in the media. The undecided segment grows while the violent extremists are the only ones acting. Bill Gates once thought the advent of the internet would bring about a sharing of truths and self-correcting news for anyone. Instead, it has empowered various insanities and evils to find others who think the same way, and give them voice. Beware.

There are a number of items taken as true today by many people that are accepted but wrong. Make sure what those around you take for granted are based in fact, such as these items.

a. There are many reasons why viruses, such as the common cold, spread more easily in the winter, but the actual temperature isn't one of them.
b. MSG is Safe. For years Americans were told it was dangerous.
c. Vaccines Don't Lead to Autism.
d. Vaccines Are Beneficial (I can't believe I have to include this, but, well, humans are idiots.
e. Jesus Wasn't Caucasian. He was born and raised in the Mideast, but churches knew Europeans and Americans would not follow a leader who looked Muslim or Hebrew so they made him very white.
f. Evolution Is Real (another one I have to say out loud, then look over my shoulder to see if I am about to be attacked)
g. Homosexuality Is Not a Choice. Restrictive cultures force people to stay 'in the closet' to avoid condemnation & thereby live repressed, haunted unhappy lives. Permissive open societies encourage honestly which leads to attacks, discrimination, & thereby live repressed, haunted unhappy lives. Take your pick.
h. Climate Change Is Real – no, it's not caused solely by humans, but we are accelerating it significantly and should be trying to influence it in the other direction.
i. Birth Control Doesn't Ruin Fertility – side effects, sure, but infertility isn't one of them.

Richard Feynman said he thought it much more interesting to live not knowing than to have answers that were wrong. He didn't feel frightened by not knowing everything, which is always the way of reality. Lesser minds are afraid of the dark, so invent something, anything, just to have an answer.

12 Breakdowns of the Scientific Method

There are oddities in nature that when first observed cause us to doubt science or logic. These oddities are not the subject of this section, for once they are explained they are quickly understood by any non-scientific mind. For example, sailors at sea or travelers of the world's great desserts often report illusions seen at the horizon, which when reached prove not to be there. This phenomena are explained once the refractive properties of visible light are understood.

There are, however, phenomena that are completely counter-intuitive to our three-dimensional senses. Without mathematics, there can be *no understanding of them* It may be that as we understand more and more at the very small and very large ends of why reality is what it is, there may be limits to what the scientific method can reveal. Until then, that method is the best we have.

We have seen where the large truths of physics often conflict with our instinctual senses and thought patterns. This is why it is critical to understand the math behind the simple things that can be tested to infer the larger things upon which our technology cannot (yet or with great difficulty) perform direct experimentation. Here are a few odd but true items we are currently struggling to fit into larger pictures or understand why they occur:

Optical Pathways in Large Gravitational Fields (Einstein & Black Holes)

Einstein's work with general relativity strongly implied that gravity as a phenomenon would bend the very fabric of space around large enough objects, like the sun. While his math was solid, direct observation by experiment escaped us until 1917, when the opportunity arose during the perihelion of the planet Mercury.

Observers watched Mercury carefully as it drew close to moving behind the sun in its normal smooth orbital travel. According to Einstein, Mercury should appear to speed up just before disappearing behind the sun and again as it reappeared out the other side. The amount expected was carefully calculated, and sure enough, our best telescopes at that time observed exactly the Einstein displacement. Repeated observations (good scientific method) have since confirmed his findings without exception.

Gravity bends space itself. Mercury doesn't speed up without reason, but the light from it travels along the bent fabric of space when very near the sun, making it look like it's moving faster.

Twin Paradox

The works of Lorenz employ an equation for time dilation; Einstein's theory of special relativity pointed out its reciprocity, also called symmetry. As a practical example of the result, we can safely predict that if a pair of twins wave goodbye to each other as one prepares to launch into deep space for 30 years at 99% of the speed of light, when the 30-year round trip is completed, the twin on Earth will, of course, be 30 years older. The twin on the rocket will however only be 4.24 years older. Without the math, this surprising result could have caused havoc on the return of the twin astronaut.

Creation of Matter

Among the most expensive and complex scientific instruments ever created are the super-colliders. These devices perform matter and energy studies doing just what their name indicates – strike two objects together at extreme velocities and new particles and energies are found. This is done to ascertain just what the objects under study are composed of, and their properties. It's like breaking open an apple to discover the core and seeds within. The most recent colliders have been used to generate energies in waves from which particles of matter are created! That's right, we can create matter itself, just by using enough energy.

Consciousness

Thanks to recent (1990s) scans of the brain in action - the human mind makes decisions & choices somewhere and the verbal-conscious mind rationalizes the choice afterward without connection to the decision area. Logically we can never know why we make choices, only rationalize the decisions after the fact. Questions of soul and free will and the conscious mind as understood by Freud and Jung and Skinner were viewed in light of limited empirical theories which have no bearing on reality via experimental data. Needless to say, there is a lot of resistance from those with vested interests in such empirical, but profitable, 'soft' sciences, religions, and astrology.

Machines and measuring devices of the 1990's finally allowed direct research into brain functions which conflicted with most of the most popular theories of the time. For example, a test subject was wired for measurements of brain activity in various regions. Presented with a banana and a chocolate cookie, they were asked to choose which one they preferred at the moment and eat it. They were asked while doing so why they chose the banana. Some subjects said they did so because they were not a big fan of chocolate, others because they loved chocolate but were dieting, and others said their doctor noted they needed more potassium in their diet. In all cases, the signals from the part of the brain causing the arm to move to the banana and made the choice **were not connected to the part of the brain that spoke** its reason for the choice. Essentially, the verbal speaking parts of brain consciousness completely rationalized the reason for the choice. The part making the decision had no voice of its own. In fact, the firing of the neurons explaining why we did what we did occurred out of time sequence with the actual decision area. In other words, consciousness is social fronting, therefore we can never really know why we do anything. Perhaps organic creatures will one day evolve that are actually conscious, but it's not us. Maybe our androids.

Quantum Entanglement

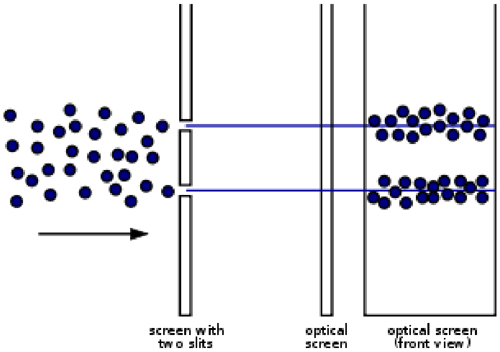
A physical phenomenon occurs when pairs or groups of particles are generated or interact in ways such that the quantum state of each particle cannot be described independently of another, even when the two particles are separated by a large distance – instead, a quantum state must be described for the system as a whole. This means if we flip over one object of a pair, the other object automatically and instantly flips – no time delay). If, therefore, we take one of a pair of entangled particles and travel with it to another planet or star system, we might flip one part causing the other to flip as well instantly, thereby setting up a Morse Code quantum telegraph service. Unlike matter, information can travel more than the speed of light! Completely counter-intuitive.

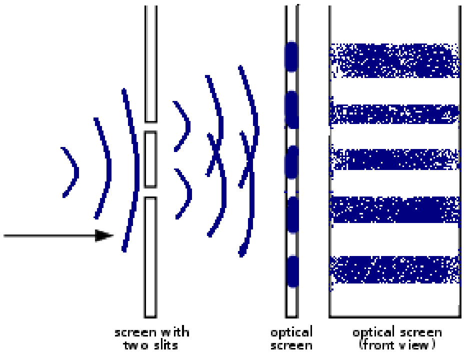
Particle & Wave Experiment Thru Slits

The Dual-Slit experiment of wave-particle duality: demonstration that a quantum object is both wave and particle.

1. Particles are sent onto a screen with 2 slits. The particles hit the screen randomly. Some miss and bounce off, some go thru one slit or the other. They make a shotgun pattern scattered on the detector wall straight ahead. Expected.

2. Waves are sent onto a screen with 2 slits. Coming out of the slits, the waves interfere with each other resulting in diffraction fringes on the detector wall from where they reinforce or negate each other. Expected.





3. A Quantum object is sent onto a screen with 2 slits. Its wave reduces into a particle when touching the screen, and is more likely at positions where the wave was more intense. Impacts occur on the detector wall as particles, and interference fringes occur as with waves.

4. Add an observer at the screen. If an observer measures through which slit a quantum object goes, then that wave reduces and goes only thru one of the slits now. No interference can occur anymore since there is only one wave passes through at a time – so the presence of an observer has modified the experiment. The wall is hit with a shotgun pattern of particles everywhere by random probability of the expanding wave function. Unexpected.

This result has been repeated with not only electrons but larger quanta up to 800 atoms in size. To make matters worse, the timing of the experiment has been performed with great precision; time to reach the screen, time to get to the wall. It turns out that if the observer comes into play after the wave has passed thru the double-slit screen, it hits the wall just as though the observer was in place the whole time! The only explanation is that the information controlling the collapse of the wave function and choosing a single slit **traveled back in time** because of the appearance of the observer.

Problems of this type occur throughout the application of quantum mechanics. As Albert Einstein wrote, *"It seems as though we must use sometimes one theory and sometimes the other, while at times we may* *use either. We are faced with a new kind of difficulty. We have two contradictory pictures of reality; separately neither of them fully explains the phenomena of light, but together they do."*

Speed of Light is Constant

How about this one? Some physicists have proposed the variation in light speed to explain a quirk of the early universe – its lumpy density. When the Universe first formed after the Big Bang, its density was erratic as it expanded. Traditionally, this has been explained by inflation theory, which suggests that the Universe went through an extremely rapid expansion phase before slowing down to its current rate of expansion.

The Universe as we see it today appears to be the same everywhere, with a relatively homogenous density and leftover 3^oK radiation. But if the speed of light has always been the same, then there hasn't been enough time for light to reach the edge of the Universe and "even out" the energy. Inflation theory suggests that the early Universe was evened out when it was very small and then suddenly expanded. Although this would explain the modern observable Universe, it means that a special set of conditions existed at that time that created the "inflation field", where the present laws of physics were not yet fully in place.

Remember The Celestial Wheel Theory

To understand physics at a sub-atomic level, a device has been employed which has no physical reality in our three-dimensional world. To explain the attraction and repulsion of electromagnetic opposites, 'virtual particles' are employed by which an exchange occurs between all positive and negatively charged objects, and it is this exchange that causes either the repulsion or attraction. Yet no one has ever seen or measured such 'virtual' particles. Similarly, gravity waves have been proposed to account for the attractive force of gravity, which has no repulsion component. Yet no gravity waves or shields against it have been measured or established by experiment.

Such devices have been extended into such projects as 'string theory', 'membrane theory', and the study of black holes and wormholes. Neutrinos, which interact so little with solid matter that millions are theorized to pass through the Earth each day without effect, and quarks, which in their various flavors and properties are theorized as the basic building blocks of matter.

It would do well for scientists to remember the discredited celestial wheel theory. Using only the evidence of our eyes, it was once believed that Earth was the center of the universe and all the planets and the sun itself revolved around us. As telescopes became better, we found anomalies in these 'perfectly' circular orbits which were then explained by saying there must be a smaller perfect circle on the main orbit circles, causing the observed wiggle. As telescopes progressed, more and more anomalies were seen, which necessitated more and more 'perfect circles' added and built one on top of another. Eventually, this theory collapsed under the weight of its own absurd result.

Present theories this close to the edge of our knowledge and the unknown may all suffer the same fate. It has historically paid off to take a step back now and then from a favorite theory when the explanation becomes too complex or convoluted. Especially Dark Matter and Dark Energy.

Dark Matter and Dark Energy

Unlike many scientific names for specific principles, constants, properties, or forces, the terms dark matter and dark energy are chosen as a constant reminder that from a scientific point of view, they represent phenomena that completely confound our present attempts to understand. They may be aspects of already understood fundamental forces or something completely new.

There was a long debate in the 20th century as to whether the universe would continue to expand indefinitely, as redshift observations of starlight confirm it is doing now, or whether there is enough mass to cause it to eventually collapse upon its own gravity. The debate reached a new plateau when a new and surprisingly enormous potential source of matter was theoretically proposed: dark matter & associated dark energy. These phenomena, complex aspects of quantum mechanics, seem to contribute more total mass of the universe than visible matter. It does not emit or interact with electromagnetic radiation, and so has not been directly observed. This would imply plenty of matter to overcome the original velocity of expansion from a big bang and to ultimately collapse into a big crunch.

To make matters more confusing, recent observations have shown the acceleration of matter at the edges of the universe is increasing, pushing away from each other with increasing velocity! This implies a heretofore unknown energy of repulsion, now referred to as dark energy.

NASA currently estimates that if true, then only 0.4% of the universe are stars (normal baryonic matter), 3.6% interstellar gas, 22% dark matter, and 74% dark energy. Whether these dark matter theories hold up remains to be seen, as well as its impact on the ultimate fate of the universe; continuing to expand from the original Big Bang 13.8 billion years ago into a final cold death many billions of years from today. We just don’t know yet. Personally, my calculations show we are better off varying the Hubble expansion constant which implies a 27 billion-year-old universe instead of the 13.7 billion, but does not require dark anything.

True Humans versus Mutts

In reviewing the evolution of Sapiens on Earth, we should consider the following disturbing facts. Neanderthals developed first, coming out of Africa. Most migrated north into the Mideast, Asia, and Europe, leaving behind an Africa in which they were not successful and maintained little presence. They did much better in Eurasia, expanding to several hundred thousand individuals if not more. Much later, Sapiens developed in Africa. Unlike Neanderthals, some of us remained in that continent to dominate it and evolve into modern Africans. To this day, measurements of Neanderthal DNA in Sapiens of Africa is extraordinarily low, almost non-existent at around 1.5%.

Some Sapiens migrated north as did the Neanderthals and cross-bred with the Neanderthals they ran into. The mixture of Neanderthal DNA in humans outside Africa runs from 5% to as much as 45%! When modern Asians and Europeans felt they were different in some fundamental way than Africans, they were right. But Hitler and his kind were completely wrong in their analysis – it is the Africans who are nearly 'pure' humans. The rest of the world, which developed gunpowder and space travel and books to pass down knowledge, are impure mutts. The real Sapiens of Africa were limited by their DNA to fire, agriculture, and art. They were much like the natives who kept migrating out of the range of Neanderthals across the Bering crossing into North America. People who by and large failed to achieve European or Asian technologies but who were successful in their environments without it.

Meanwhile, it is the mix in our ancestor DNA that made us a technological species at our level. Gunpowder, metallurgy, computers, life expectancy extension, and spaceships, leaving the Africans & American Indians behind. Yet in the ecological long run, it is the pure Sapiens of this world who have lived without damaging it, and we mutts and mixed-breeds who may eventually destroy our environment. The jury is still out.

13 Basics On Money

One thing glaringly missing from American schools is to teach finance. Like it takes a Ph.D. to know a bargain from a waste of money. To most Americans, finance just seems to happen as they blunder through life. A little basic training upfront can remove the fear that it is brain surgery.

When you buy a new car, as soon as you leave the dealer's lot you have lost $10,000. A new car loses 60% of its value in the first 5 years. Many people consider this a good investment. They are idiots. Most of my investments go up.

Caution: The Dunning-Kruger Effect is a cognitive bias where people with limited knowledge overestimate their abilities. It stems from the power people get by speaking out: lacking in knowledge or skill not only making someone prone to errors but also incapable of recognizing their own incompetence. This is even worse than ignorance as such people act, such as G Thunburg or M Greene, whereas those who know they are ignorant do not. Learn before acting.

To leave a 20% tip (standard) on a meal at a restaurant, just divide the bill by 5. That's a good tip. Doubling the tax is a cheap one.

Find out how long it will take your money to double from investing a sum at a fixed rate. This is called the rule of 72 to estimate the effects of compound interest.

> Just divide the number 72 by your annual interest rate, and you get the approximate number of years that it will take for your money to double.
>
> If you were to invest in a 0.9% CD, it would take about 80 years for your money to double. On the other hand, if you were to invest in a fund with a 7% return, it would take your original funds about 10.28 years to double. If you want to know how long it will take to triple your money, divide 115 by the annual interest rate.
>
> A quote of Einstein: "Compound interest is the 8th wonder of the world. He who understands it, earns it. He who does not, pays it."

Sometimes to make a fair comparison between jobs you need to compare the hourly and annual rates of each job. For example, if you can work the same amount of hours, which job pays better, one with an annual salary of $58,000 or one with an hourly rate of $31?

> Figure out the hourly rate of an annual salary by dropping the three zeros and dividing that number by 2. In this case, the hourly rate would be 58/2 = $29. Keeping all other things equal, the $31/hour gig pays better (based on a 2,000-hour work year).

Is it cheaper to buy 7 of something for $10, or 3 of something for $4? For any problems like this, use the same math technique: *lowest common denominator* = how much for 1 item.

$10/7 = $1.43 each $4/3 = $1.33 so clearly buy the packages of 3.

Is it cheaper for an electric space heater or an oil space heater? Use this logic for lots of things. Given an electric space heater or an oil space heater cost $100 to buy, what else do we know:

> Given the electric costs $0.20/hr to heat the room and the oil costs $0.10/hr
>
> Given the electric heater lasts 3 years and the oil heater lasts 2 years
>
> The common denominator in time is 3 x 2 = 6 years. Then you spend $200 for 2 electric heaters but $300 for 3 oil heaters. While running them for 6 years, the costs are
>
> 6 years x 100 winter days/yr x 8 hours/day = 4800 hours
>
> Electric = $0.20 x 4800 = $960 plus 2 machines Oil = $0.10 x 4800 = $480 plus 3 machines
>
> For total cost, the oil is cheaper ($780 vs $1160). Adjust the numbers for what heaters you buy and how long you run them. This will work for any similar situation in life looked at this way.

A car loan is the most common loan in America. If you can pay $X car loan per month maximum, should you have a 1-year, 3-year, or 5-year?

> At the same interest rate, the longer you take to pay a loan, the more interest you pay, so pay off whichever loan you can the fastest. With several loans, pay the highest interest rate first.

A mortgage is the largest loan most Americans will experience. If you can pay $X mortgage per month maximum, should you have a 5, 15, or 30 year? A longer time means you can afford a larger loan.

> What if they give you a lower interest rate for the longer loan and a higher rate for the short one? Do the math to see which is actually cheaper. Same for car loans. There are online calculators to help you.

Student Loans and Credit Cards are often the most misunderstood loans in America. Paying back any loan is the final step in any loan process, but there are different ways to do it. With student loans, you can often pay them back slowly over time or rapidly all at once. The key is the interest rate on the loan vs the inflation rate in the economy.

> If Inflation is making things more expensive every year by 8%, and your student (or any other loan) is set at 5%, do not hurry to pay the loan. Pay the minimum, since you are paying with *less valuable money* over time. If however inflation is running at 3% and your loan is 10%, pay it off as soon as you are able. This logic is why this author paid his student loans at the slowest monthly payment allowed over 7 years: the loan was costing 2% but inflation was over 5%.
>
> Similarly, if you have credit card debt at 12%, and see an opportunity to invest in a savings bond for 8%, do not do it! Pay off the credit card first and you will make 12%, not 8%! This seems simple, but an amazing number of Americans will do almost anything with their money before they pay off a high-interest credit card. For example, if you suddenly inherit some money, and

have a mortgage and several credit card balances, what do you pay off first? The one with the highest interest rate – ignore which is larger in dollars. Pay the high interest first every time.

Credit Scores: A single 'hard inquiry' about your credit won't have a huge negative impact, but applying for multiple lines of credit in a short period of time could lead to a hit on your credit score and lenders considering you a higher risk. So if you are planning to go off the grid, do one big loan and cash it in like I did – don't ask. After a dozen years, that old amount goes away so today I have an 801 credit and can do it again if needed. Said the bank manager as the robber walked out with a mask, a gun, and a few hundred in cash, "Stupid amateur." Have credit but don't use it for anything you can't pay off immediately.

The FICO credit score is a scam by banks to keep you in debt. If you increase your FICO score you can get into debt so you can increase your FICO score so you can get into debt…see? Know the reality to make it all work in your favor, like I did in the next paragraph.

Paying for everything in cash might sound smart, but it hurts your credit. Banks and card companies are not there to help you. Their business models are designed to keep you in debt. So take out a loan you don't need, pay it off fast, and watch your credit rating grow. My first was an $800 car which I had the cash for but instead walked into a bank with my pay stub as an engineer and got approved on the spot. 5 months later I paid it off and took out a $3000 loan for a used sports car. Same thing, and I never looked back. Then when you need a real loan, like for a house or a business, you will get a better rate. They were throwing credit cards at me to get me to the point where I could not pay them off completely each month: that's how they make money = on interest. I have 3 cards now for $10,000 total credit which I don't need but use to pay my monthly bills. I never pay interest, and they are ready to lend me a lot more anytime I actually want it. Paying interest over time makes someone else rich, not you!

The facts:

-The average credit score in the U.S. is 714.

-The average credit score for Americans ages 18 to 25 is 679.

-People older than 77 have the highest average credit score of 757.

-Low-income families have a median credit score of 658.

-Asian Americans have the highest credit score of any race at 745.

-Black Americans have the lowest credit score of any race at 677.

-Credit scores are even when comparing men to women.

-21% of Americans have a credit score in the 800 to 850 range (the best).

-Your payment history accounts for 35% of your credit score.

Taxation in America is another area where most people do not benefit from employing math. Calculating your annual federal tax is complex, so once a year it is figured out and you either owe tax or receive a refund.

The smart thing is to always owe taxes. Why?

If you set your deductions through the year such that you owe money at the end of the year, the government has *given you an interest-free loan* on that amount of money. Money that you have kept, perhaps in an interest income account or making dividend income.

If you set your deductions such that the government owes you a refund, *you have given them* an interest-free loan on your money. An amazing number of people do this. Even when it is pointed out, their excuse is the refund acts as a forced savings plan which they need because they lack the discipline to do so otherwise. While I sympathize, it saddens me.

Stocks

Stocks are a way for anyone to own part of a publicly traded company. Many companies and businesses are private and not listed on national exchanges where you can buy or sell ownership of anything from Mattel toys to Nvidia computer chips. If the country prospers, businesses prosper.

Ownership allows you to profit when the company profits by your shares becoming more valuable. You risk losing money if the company does not do well and the shares lose value.
Some companies pass along part of their profits to shareholders as dividends, by giving you money periodically depending on the number and type of shares you own.

Bonds

A bond is an interest-bearing instrument by which a company or a government raises money by promising to pay it back over time with interest. Generally, the longer they hold the money the larger the interest rate they will pay for tying up your money. The interest rates they pay you vary with the credit strength of the company or government and the terms of the bond.
Federal notes include Bills (several months long), Notes (2yr – 10yr), and Long Bonds (20 – 30 years).

Comparing Valuation

At times when interest rates are very high, the stock market generally does less well since there is a much higher risk in stocks. At times when interest rates are very low, the stock market generally does better since bondholders sell their low-interest bonds to take a chance in the stock market, thinking it is worth the risk. This buying drives up the stocks.

When buying a home, and needing a mortgage to do it, the best time is when interest rates are high. Most people will not buy during high mortgage rates, so to sell their homes, sellers will keep prices low. Most people will buy during low mortgage rates so sellers will keep home prices high.

If you buy at a time of low interest rates, over time rates rise and fall, but *you can never re-negotiate* since you already have a lower rate on your high-priced home. If you buy at a time of high rates, over time rates rise and fall so *you can renegotiate* a new loan to a lower rate, and have *locked in the lower price* for the home. The author happily did this several times. My first home was bought when rates were 17% and the house was dirt cheap. Later I re-negotiated a cheaper interest rate when they came down. If you buy when rates are low, you cannot renegotiate the price of the house!

Casinos & Sports

Many people spend a lot of time and money gambling at casinos and placing bets on sporting events. This is considered fun and adds excitement to what you are doing. People even make bets with friends about events happening around them, like “I bet I can sink this golf put.”

All well and good, as it is part of the human condition. Many people never seem to bet on anything. Many do. For them, there is a danger in thinking you can gamble professionally and win. Gambling against another person pits your skill against theirs in one form or another. Like poker or bridge. So far so good, unless you gamble with what you cannot afford to lose!

Gambling with a casino is ignorant. Why? Math. The games that casinos choose to offer in casinos all have hundreds of years of history such that the math is very well known: if you play long enough, the casino will eventually win. There is a surefire way to win at a casino.

Own one.

Answer me this: You know people write books or blogs to try to encourage people to do things. To vote for them. To become doctors or movie stars, telling folks how wonderful it is. So if you owned a casino what kind of books would you write? I guess a few of you have it already: you would write a book saying you have a ‘system’ to beat casinos. Or you were so good at it you were ‘banned’ from playing at casinos. These are lies.

How do you know every one of them are lies? Because if **any one of them** were not, all casinos would go out of business in less than a year. Maybe a month. Pretend you are the casino again and you’re smart enough to know this too. So how do you make the book more believable? You invent fake ‘systems’ that are so complex, that it is not easy to do or to easy prove that they do not work. New people graduate from school every year, and sooner or later some decide they read about something that looks like it can work. And of course, they lose. A new crop of victims, some who learn to stop quickly and some who do not.

Friendly bets with a friend over a game of skill between you or a sporting event are fine. But do not allow human weakness and greed to make money without working to overcome your good sense. Patrons of casinos are not called “suckers” because they act smart.

Lotteries

As with casinos, lotteries are designed by government entities to raise money. Some support the education system, some to build roads and bridges. They would not run them a single day if they were not profitable. Yet millions of people fall into the very human trait of ‘proportional risk’.

The rationale is that you are only ‘betting’ a small amount, which will not hurt you terribly when you lose, but if you win it can change your life. It does change the lives of a few people compared to the millions who keep playing and hoping.

The math says you have a better chance of being hit by lightning or a meteor than winning. Decide for yourself. The government already taxes you to raise money. Decide if you want to give them a little more. For everyone like my sister who made money are a thousand losers.

Retirement Savings Math

I recommend various retirement accounts so if you put a little away for a long time, one day you will be able to stop working and live off what you have saved. A critically important part of this is to avoid paying taxes on money you will not enjoy today, at the high tax rate you now pay because you have high income, but to defer the tax until a time you are not working, and have only a small income from your investment savings.

To encourage this, the federal government allows you to place up to $2000/yr into an account without taxing you on it. If you are in a 30% tax bracket, that is like making $600 the first year you do this. It is an excellent idea. The allowed amount sometimes changes so pay attention.

$FV = PV* (1+i)^n$ where: FV = future value PV = present value

i = interest rate per period n = number of periods

Here is an example of what $2000 today can grow into when you put it away at 5% for 30 years, getting interest on the money and the interest from previous years:

$2000 today at 5%= $3,258 in 10 years = $5,307 in 20 years = $8,644 in 30 years

If you add $2000 *every year* it compounds to $144,500 in 30 years! $5,000 per year becomes $360,000!

There are many ‘vehicles’ in which to deposit such money, which can get a little complicated. See a professional when deciding (or becoming one):

IRA – a tax-deferred or tax-free account approved by the IRS

401(k) – are defined contribution plans where both the employee and employer can contribute to the account up to the dollar limits set by the IRS

457(b) - is a type of tax-advantaged retirement savings plan available to employees of state and local governments, as well as employees of certain non-profit organizations

Keough - is an employer-funded, tax-deferred retirement plan for unincorporated businesses or the self-employed

Social Security Math

"Social Security" is the term used for the Old Age, Survivors, and Disability Insurance (OASDI) program in America. It's run by the Social Security Administration (SSA), a federal agency. It's best known for retirement benefits, but it also provides survivor benefits and income for workers who become disabled.

It is a federal forced savings program for taxpayers. Part of your taxable salary is set aside and matched by your employer (more or less) to pay you a monthly income after you retire. The system can be complex, and change with politicians, but there are some core basics to know.

-Workers must be at least 62 years old and have paid into the system for 10 years or more to qualify for Social Security retirement benefits.

-Workers who have paid into the Social Security system for at least 10 years become eligible for early retirement benefits at age 62. Workers who wait to collect Social Security until age 70 will receive higher monthly benefits.

-The amount of those benefits is calculated based on your average indexed monthly earnings (AIME) during your 35 highest-earning years so it varies from person to person.

-People who can't work due to a disability and surviving spouses and children may also be eligible for benefits if they meet certain requirements.

-Workers can earn up to four credits each year. For every $1,640 earned in 2023, one credit was granted up to $6,560, or four credits had been achieved. For 2024, the amounts are $1,730 and $6,920, respectively. That money goes into two Social Security trust funds, which are supposed to keep it safe from greedy politicians.

-Spouses can also claim benefits based on either their own earnings records or their spouses' records. A divorced spouse who is not currently married can receive benefits based on an ex-spouse's earnings record if the marriage lasted at least 10 years. Children of retirees can also receive benefits until they turn 18, or longer if the child is disabled or a student. The cutoff is age 16 if you're caring for a child who is not your own. Check out the free pdfs online from *.gov websites, like https://www.ssa.gov/pubs/EN-05-10024.pdf

Medicare is the federal health insurance program for Americans who are age 65 and older and some people who are receiving Medicare benefits due to a disability. It is also supported through payroll withholding. That money goes into a third trust fund.

Medicaid provides health coverage to eligible low-income adults, children, pregnant women, elderly adults, and people with disabilities. Medicaid is administered by states, according to federal requirements. The program is funded jointly by states and the federal government.

14 Basics On People

The following psychological aspects of humans are well known tricks:

> -If someone insults you verbally, pause a moment to look right at them and ask. "Are you ok?
>
> -If you think a person is lying, stare back and forth at their eyes without speaking.
>
> -If you are in an argument, keep your voice down; it indicates you are winning.
>
> -Good posture increases confidence; spread your body out and Take up space.
>
> -Your eyes dilate when talking to a person you love.
>
> -If a person is aggressive with you, even putting words in your mouth by using 'you are saying…' or use a barrage of smashed accusations or other manipulative tricks. Then purposely relax your body and say "Actually, what I am saying is[and repeat yourself]" or "I am not saying that." Like they are an idiot.
>
> -The biggest mistake people make is they talk a lot while you listen a lot. You are learning everything about them, while they are learning nothing about you. NOT the other way around.
>
> -A strong person will make the effort to create a better future for themselves while a weak person will lament and blame their past for their present.
>
> There are dozens of such techniques known to psychologists (not psychiatrists). Study them. Arm yourself by knowing such tricks.

Acknowledgment is made up front that this may be a most controversial talk. One which strikes at personal illusions and bias harder than any other science talk. Yet good quality science has been performed by social scientists. Everyone has opinions, so I present here only those things I have seen myself work in a variety of cultures, in many countries. As elders, we should at the very least be able to instruct the next generation in techniques known to con men and pimps and employed by them. Do we not talk about it for fear of helping evil? Do we not owe it to the next generation to arm them with basic information, not in dispute by anyone except those selling an agenda?

Unless this is addressed, it feels like life is designed for failure pushing every man for himself. Many are passive and allow life to roll over them. Many are active and lash out to destroy to feel any relief. There is a genuine urge to destruction which evil will encourage. Decide to do something better.

It Starts With Confidence: Learn by Doing

Ever notice how someone confident tries something smoother than a timid person? More aggressively leaning into it? And instead of frustration by setbacks take them as challenges and learning points? These people are also harder to deceive.

To get confidence in the first place, start small. The best example is building my first bow and arrow. Take a green piece of whatever wood is available to cut down – it is free, unlike seasoned ash staves which can be expensive. You will worry about wasting the seasoned ash, so using cheap green wood removes that stress and lets you think & act better. *Stress and fear kill the help your brain can give you.* So whatever you are trying, change the game until you are in a mental place with less stress. Money. Witnesses who will laugh. Whatever. After that first green bow shot an arrow made of my father's hedges right on target, I knew I had abilities past the ones that were obvious to my friends and family. *I could use my hands. I could learn.*

When Power Centers Lie To Themselves

Take the example of police experiencing mixed tactics. On the one hand they increasingly have programs labeled as being for the people, and mottos stating they are on the side of the people. On the other hand they continue to militarize employing actions designed to protect themselves and the powers that be from the people. A clear conflict. The contradictory nature of any police force will be on full display for your education. Shooting an unarmed black nurse as she sleeps in KY with a dozen bullets (the wrong apartment) while refusing to go into a school as they stood outside hearing children being slaughtered by gunfire in Uvalde, TX (cowardice) is informative. So is listening to the excuses.

Slaves, Tyrants and Liars

How do you know when someone lies? When they tell you what you want to hear or what you fear? I recommend the study of folks who lie all the time. Like politicians.

I love the tee shirts I've seen saying '*Instead of Thoughts & Prayers how about Policy and Actions?'* Political liars will offer platitudes and good wishes which change nothing. After every school shooting. Before every election. Most politicians will never be heard making a clear statement that can come back to haunt them, so weasel their words to say later, "No, no that's not what I meant". Study them. They give statements that cannot bite them later. Yet these men and women are charged with running the country. These are tyrants who will say or do anything to get elected.

When you have no choice in an election, there is no election, just different powerful faces taking their turn. You are then a slave. In America for 50 years politicians have been calling a 55% to 45% election a blowout! A mandate from the people. Really? Sports fans know what a blowout is. 70/30. Even 60/40 is a strong win. The difference for President has not been larger in decades, putting a lie to the idea you have a choice. Instead of a conservative vs liberal 2-party system, Americans have a one-party system: the property party. My father showed me the annual company reports for IBM, General Motors, and Coca Cola who knew this truth. Under political donations, they gave huge amounts to both parties. That money gave them access to whoever wins. One party.

Schools do not teach how to detect liars or how to negotiate. How to push back against lies. You can be a slave to a tyrant, or you can negotiate. Go to the web and explore the ideas of academic professionals, like J Peterson. Or classics like F Nietzsche and N Machiavelli. Avoid the blogs of people using you for money or power. There is no shortcut beyond study & experience. Enough said, though hard to do.

Opinion, Superstition, and Verified Truths

How to tell these things apart is critical. I am not going to tell you what to choose. What opinions to have, what superstitions from rabbit's feet to a lucky hat to believe in, or what truths to embrace. That's between you and the person looking back in a mirror.

But knowing how to tell truth from lies is a skill that will serve you well. And like riding a bike it needs to be practiced. There are ways to tell when someone is knowingly lying. And ways to tell when even if they believe it, it is not true.

Opinion – when you think something is a certain way. Others may agree or disagree, without rancor.

> Oreos taste better than chocolate chips.
>
> I like that hat you are wearing.

Theory – when you have an opinion, then look around your world for supporting evidence that supports that opinion. Some people may agree with that theory, others may disagree with that theory without being demons.

> The Dallas Cowboys will win the Super Bowl this year.

Scientific fact – when a theory can be verified by experiment independently and repeated with the same result by someone else. A scientific truth is true whether you feel it is true or not:

> The speed of light in a vacuum is 3 x 10^{10} m/sec = 186,000 miles/sec
>
> The Earth is round, not flat.
>
> Note that scientific facts can change over time as experiments improve:
>
> 1890 - Light travels in a straight line.
>
> 1950 – Light travels in a straight line unless bent by the curvature of space in the presence of sufficient gravity.

Faith or Feeling – when you feel something to be true for you that may not be true for someone else.

> My Uncle Fred can be trusted. I feel it right down in my bones!
>
> Why? Because you know him your whole life. He is always good to you. He is never mean and has never lied to you. **But** he is your uncle – others do not have the same history with him so lack the same trust. Some do, some don't.

Another group to practice how you might miss the truth or be misled is to pay attention to advertising. The job of a commercial is to convince you to buy something, go somewhere, or believe something. Are they presenting you with facts or are they sharing opinions? Remember, like politicians, this is their job and they are very good at it since they practice every day.

A billionaire does not need to ask you for money. It's illogical.

Another lesser practiced wisdom is that you should never share opinions with someone who resorts to emotional opinions in an argument. A person who argues from emotion and not from facts will ignore you and beat you with experience. Learn to recognize when someone is ignoring your opinion and just waiting for their chance to talk.

Another tee shirt is '*you should never argue with a pig. You both get dirty, and the pig enjoys it'.* This is wisdom.

Simple Techniques used by professionals:

- Argue from emotion (only a stupid person would not agree with me – are you stupid?)
- Argue from authority (a movie star said it in a commercial so it must be true)
- Argue from the majority (everyone else in the room thinks this)
- Tell you what *you want to believe* is true (otherwise it's much harder to convince people)
- Tell you what *you fear is true* (a most dangerous technique for war & politics)

By war, we do not just mean armies being told to go fight an 'enemy' army. This is also applied every day to war on a small scale. Getting you to dislike someone for something they never said or did because they know you would dislike them if it was true. Getting you to not vote for someone when they claim the other guy does things you don't like. Powerful everyday stuff, and not always easy to see.

Dark psychology is used to manipulate people: be warned. Those of you who will do this already know and learn about it, but your victims are not taught this in school and become easier victims. Types of dark psychology:

- Gaslighting – makes you question your own sanity or reality
- Emotional manipulation – using deception; makes you feel sad/guilty/ashamed
- Reverse Psych – used in parenting or by teachers & managers
- Love bombing – showering attention & affection to make you emotionally indebted
- Authority – politicians use verbal preaching & companies use celebrities
- Choice restrictions – boxes you in even if it means withholding other options

Harder to detect are tactics of *pre-suasion*. Experiments of the scientist Cialdini shown below work so well afterward people denied measurable influence on their decisions, even when it was brought to their attention.

-Men get more yes answers when asking a female stranger for her number in front of flower stores than any other kind of store.

- Men get more yes answers when asking a female stranger for her number when carrying a guitar case than carrying any other single object.

-Furniture store webpage: a background = clouds had more people making a decision based on softness & comfort; a background = coins made more people decide based on lowest price.

-Salesman comparisons: “Well obviously I can’t charge you a million dollars for this, it’s only $75,000.” It changed customer behavior instead of directly saying what a thing costs.

-When taste testing a new energy drink there was resistance to participating in the test. Then testers first asked people if they considered themselves adventurous. Many more agreed to take the test.

-After boring a potential customer, a banker said: “The next product I’m going to talk about is the one I would recommend to my mother to invest in.” Customers suddenly paid more attention.

> A core idea in each Cialdini experiment above is Unity: the sharing of personal identity. It is a technique that shifts your mind to helpfulness, fairness, not being left out, or even romance before they make a pitch to sell an object, an idea, or even themselves.
>
> Many use family-driven unity, such as getting parents to respond to a school survey at better than the 20% normal participation. A smart teacher offered a 1-point reward on their child’s grade for that class. Only 1 point in 100. Inconsequential, but by invoking help to a family member the survey went from 20% to over 90% parent participation.
>
> Pre-suasion changes how a person perceives themselves or perceives the talker.

A picture of a thinking man nearby makes people in an office more analytical in their tasks. A picture of someone winning a race makes people produce more. To plant a seed, every farmer knows to choose a good quality seed, then prepare the soil. Soil preparation is key! Especially with human minds.

The worst money, career, or love manipulators you will encounter are dark empaths. They are 19.3% of people so not rare. They are high in dark triad traits. Stay informed, or be a victim.

I love giving examples. There are so many. Take your FOB clicker for a car. But FOB technology also makes things easier for thieves. The wireless fob will continue to emit a signal even if you're not using it. Thieves prowl neighborhoods at night looking for cars parked outside so they can carry out so-called relay attacks. Using portable equipment that can pick up the faint signal from a fob inside the house or parking lot, they relay it back to a transmitter that can clone the signal. Beware – there are so many new technologies you shall experience in your lifetime, and for each of them, a clever hack to make your life easier. And for each of them, some criminal will use it against you.

For another example, in July 2024 Florida issued an emergency notice: “At this time, FLHSMV is removing the current Florida Smart ID application from app stores. If you have downloaded the app, please delete it from your device, as it will no longer be functional. Please note, your data remains secure with the Department.” Yeah, sure, your data is safe. That’s why they are pulling the app with no replacement or transition plan in place. Welcome to your future. Be tech savvy, pay attention, or get stepped on.

15 Thinking About Happiness

Inner efficacy is an individual's belief in their own capacity to do what it takes to meet their goals. Self-esteem might say, ‘I'm amazing!’ but inner efficacy says, ‘I have what it takes to figure this out and achieve what I set out to do.’ There is a difference between braggarts and those who have the strength of knowing. Have fun with what makes you happy AND it will make you better at what you do when you grow up.

Have you seen a video of baby tigers playing with each other? One might sneak up behind another and jump out at them. It is fun, but they are practicing what will help them hunt when they grow up.

Have you seen a dog chase and catch a Frisbee or a ball? This is a lot of fun for them. When they were living in the wild without people to feed them running, chasing, & catching with their teeth was how they survived. Cats playing with a ball of yarn goes back to their roots. Many animals have fun.

Chimpanzees in the wild eat a lot of things, mostly plants and plenty of insects too. The adult chimps will ‘groom’ each other by picking through and stroking each other’s fur, pulling off small bugs. Which they eat! They do this to young chimps, who find it fun to be stroked and have itchy bugs pulled off, and they benefit from vitamins by eating them. Most fun has a purpose, even for people so do it!

Playing tag is fun. It strengthens your legs and cardiovascular system (heart, lungs).

Drawing pictures makes kids happy, even if you’re not great at it. Music making too. And teaches your mind to interpret the world around you, make sense of it, and transmit to someone else (brain).

Ancient games like checkers and chess teach cold logic and strategy, as physical games teach fast responses in the heat of the moment. Combining the two leads to winning a happy life.

Children talk as soon as their mouths can form words. Try not talking when you have something to say and see how unhappy that makes you. The ability to communicate with other kids and the adults around you teaches you how to do it better when you are an adult. Practice. Some people, like lawyers, politicians, and comedians make a living talking to others. Those who find they can express themselves well in writing do it that way. Written and spoken knowledge is how we pass on what we learn to the next generation. I was happy writing this entire essay, even if only a few read it!

Building a house out of toy blocks or a snowman out of a snow bank is a lot of fun. Humans are the best tool users among all animals. Those who are better with tools than others can enjoy making a living using tools as craftsmen when they grow up. Those who are better at designing new tools can enjoy making a living as a designer. Those who can see how to accomplish something by taking whatever tools and parts around them are available can make a good living as engineers. And people who recognize these skills in the people around them make good managers.

When you find joy in doing something, you will be better at it. Read about it as well. If it turns out to be something you can make a living at, great! Try everything. Find what you are good at. This is why the best schools teach children sports, English, math, art, and everything else. You never know what you'll be good at. Some are good at the same things their parent was good at. For some, you will be good at something very different. Find out!

A word on illusions: You look around you in real life and on the internet and see all kinds of people, happy and sad, and liars who look happy but are really not. How many know of the singer Janis Joplin who was at the height of success loved by fans, and drank so much she died young choking on her own vomit? How many of you heard about a football or basketball star who made himself millions, but is now broke? Lots of them, right? They lost it not because they were bad at math or at finance, but because they weren't happy.

Can we prove it? Sure. Kurt Cobain - Nirvana. Chester Bennington – Linkin Park.

Does having millions in the bank make for a happy life? Clearly not. It would be nice to have $$$ of course, I wouldn't turn it down, but if you get your happiness somewhere else, all the money won't last or make it worthwhile. Early graves are full of people with money. Find what makes **you** happy.

Does having fame and being adored by millions make you happy? It would be nice, sure, but if that's not *your core* of happiness, then look what happened to Lil Tay. Controversial influencer and rapper online. Who knows how old she was when she died? 14. Yeah, right. And she was out there telling other people how to live.

There are easy things to chase. The first most think of: Money. Fame. Power. Be careful what you chase, that for you it actually is the core of your happiness. Better if it is just a means to your real ends!

Can we prove it?

How many of you know of the movie star Hedy Lamar? Back in black and white movies, talented and one of the most beautiful creatures to walk the face of the Earth. She made fame and fortune in Hollywood years ago. Then quit at the height of her career! Walked away. Married and invented an electric circuit used to decipher enemy transmissions for the military. Got the copyright. It's still used in the internet backbone today. She was smart as hell and found her joy. I was a nuclear engineer for my first 15 years out of University. But I found other things I was both good at and enjoyed more.

How many stars can you think of, can you name, who made a few great movies or music albums, then left it all behind to start a family and raise children? Or start a farm somewhere. Some like Harrison Ford did both, as he continued to act, but was a professional carpenter and flew his own airplanes. Pamela Tiffin took courses with me at Columbia University in Chinese art history – we both loved Shang bronzes.

For some people the money, fame, or power is their goal, is their core happiness, and that's fine. Really.

But surprisingly few can stay with it without resorting to drugs or other destructive behaviors. As the ancient Greek philosophers remarked, the easiest thing to do….anybody know?…. is *give advice*, and the hardest ……somebody?....is to *know yourself*.

Work at it. Understand who you are, I can't tell you that. And when life happens around you – good and bad – remember who you are in those moments. I can teach you data, I can teach you skills, but not who you are.

Kids learn who they are by doing, and by watching other kids and the adults around them. Spend a day talking or listing all the things people do in life and what you think of them in terms of happiness. Would you be happy as a stockbroker and insurance salesman? Would you be happy in the sciences or the arts? Would you be happy in a trade where you work with skilled hands? Learn.

A word on forgiveness. You can't just decide to do it. To let something go. Trying will chew away at something inside you and erupt when you least expect it. People usually just bypass forgiveness and pretend it doesn't hurt or didn't happen. Forgiveness happens organically as a process of healing so embrace the pain of being human. Cry when you must. Though a bit of vengeance does help, if not for yourself then for the next person you just saved. I know this. Sometimes vengeance is the only justice available.

There are a few concepts that can be thought of as hacks or cheat codes for life. There are many, from many folks in history, but here's a few to keep you out of the ditches while you learn them:

1. Watching how someone treats the powerless near them (a waiter, a child, the weak).

2. Focus on becoming more disciplined, not more motivated. You can't do anything about motivation: it comes or it does not. But discipline can be learned & will change your life. Practice.

3. To be successful, you must first fail (a baby learn to walk, an athlete first throw a ball, an Einstein learn to count).

4. If you learn to embrace rejection, not just tolerate it, it will make you unstoppable. The fear of rejection will lose all power over you.

5. It's not what happens in life but how you react.

6. Work hard at whatever you put your hand to, so that your choices come out of your goals, not your fears. It is better to die trying than to live in fear.

Back to the purely physical, biological front for a moment. Alcohol and drug use rob you of whatever your genetics allow you to be. However strong or smart you are, you will be less if these things are abused. Use them? Certainly! I love a beer with hamburgers, wine with pasta, and a single malt scotch for a celebratory toast. But getting smashed hurts you. Period.

According to the NHS, it takes one hour to break down one unit of alcohol. One alcohol unit is measured as 10ml or 8g of pure alcohol. It's equivalent to a small glass of wine (125ml), half a pint of beer, or a single measure of a spirit (25ml). A pint contains around two units, and one large glass of wine can be up to three units. Variation Factors: whether you're male or female, your age, your weight, whether you've eaten recently, the type of alcohol you're drinking, your stress levels.

Drink water between glasses to fight dehydration. Greasy foods should be avoided with alcohol all together – it will only overwhelm your stomach further. Two hard liquors per day for a man and 1 for a woman should provide a healthy body no difficulties and may enhance life. My Sicilian grandfather began each day with a raw egg in a shot-glass of sweet vermouth, which would no doubt cause modern doctors to faint. He lived active and healthy until 92. And horny into his 80s.

Something the young cannot control like their alcohol intake are microplastics in food. The young will find microplastics to be the top contender for poisoning by mankind in their lives this century. Scientists are still determining what to do, but there are no easy answers to removing it from the planet nor any easy way to make sure you don't eat it. None. There are man-made islands of plastic in several of Earth's oceans! By boiling & then filtering can take out a lot of plastics from water. Antibiotics in meats and fish will come in a close second, weakening your immune system. Help your body to survive our technological adolescence, children! It will likely be 2 more generations before we get these pollutants under control, if ever. Particles smaller than 1 micrometer (nano) can penetrate cells, and then you're screwed. Slowly, with no outward signs. Stay informed.

16 Goals and Sloth

A Question about those around you: what makes them laugh or dance with joy or just be really jazzed about what you see them doing?

> …what do you do just to kill time because nothing is around that makes you laugh or dance with joy or be really jazzed? That is sloth.

A Question about the adults around you: what makes adults in your life laugh or dance with joy?

> …what do they do just to kill time? That is sloth.

Decide how you will spend the hours, days, and years of your life. Find your joy or just kill time. I have a pair of nephews who have started their own side gigs (as their generation calls it). One in creative design, one as a stand-up comedian. I applaud * celebrate them both and all those who don't vegetate in a job just to pay the bills.

Try everything when you're young and flexible before you become stiff with age. It gets harder. But if you find your joy young, it stays with you forever as mine did.

Question to a group:

> …for those of you who want to be something specific when you grow up, what is it?
>
> Make a list - More than one answer is ok!
>
> > Fireman. Doctor. Lawyer. Soldier. Teacher. Plumber. Scientist. Mother. Singer.

Question to whoever did not raise their hands knowing what they want:

> …for each of the things chosen by others, what can those folks do now that's fun to get closer to doing that, or even find out if they will be any good at it? Like a singer who finds they can't sing or a football player with no coordination.

Question for whoever did have a goal for when they grew up:

> …what things mentioned have you tried to prepare yourself for that goal?
>
> …what other things they did not mention *will you* or *have you done* to prepare for *your future*?

It is your future.

Having a goal is said to be the first step in achieving that goal. Some people know early what they want to do in life. Others find out later on or are directed to it by others. Others stumble into their future. Perhaps the greatest piano player, gymnast, basketball player, or chemist who ever lived never achieved it because they never tried it, so they never knew. Never knew how great they could be. What a tragedy.

I was first named Cirino after my grandfather's father who often said, "You are dead a long time." Having a goal is only a start. You can look at it and wish and dream. That's fine. What is not fine is continuing to dream instead of trying when the opportunity comes your way.

The astronomer Tyson tells the story of his father, who was told by a coach in school that he did not have the body type to be a track athlete. This bothered him, so that day he began to run and practice and grew up to have the 5th fastest 600-meter time in the world at the Olympics. Not because he was born with the desire to run track, but with the stubbornness not to be told what he could achieve. He was a black kid who grew up to make the Olympic team in Adolph Hitler's stadium.

You will each approach your goals in life differently. Some direct (you know what you want to do or you keep hearing how good you are at XYZ), some indirect like Tyson's father, and some will find that the original goal wasn't possible for them. So they get another. Kept looking**.** Kept trying.

The greatest pianist who ever lived would never have known it if she never sat down at one. Try!

It is said that those who try for a goal and fail are losers. **That is a lie.**

It is said about goals that you always fail by not trying. **Truth**. Sloth is the true mark of a loser.

That person who tried learned something about themselves. Can now move on to another goal, having developed some part of themselves that might come in handy in the next goal. The person who never tries for a goal is never found to be happy. The person who tries, fails, fails again at something else, and keeps going until they win is always happy, even in the temporary disappointment of single failures.

I knew a young man who unlike me was not a whiz at math but achieved a degree in accounting. He tried playing an orchestral instrument. He then took his shot at being a standup comedian. This is a person of value, who took something with him from everything he put his hand to. A lot of people get caught up in the result of a life rather than of a life lived.

Before he was big, as a young man in a gym the other weightlifters used to point at Arnold Schwarzenegger and say, why is that idiot always smiling? We're working and grunting our butts off. This is brutal! Both then and in his later years, he would say that every day in the gym was another step toward his goal. Every day he got closer to his goal of being Mr. Universe. The most developed human possible. So he was happy and smiled all the time.

He only bothered to talk to those who he saw would listen. **He ignored the rest**, those who said it would never happen, those who had no goals of their own for fear of ridicule. Ignored them like people trying to sell him real estate on the North Pole. He knew better because every day he made that goal come one step closer and was happy. He did the same thing with acting, which also had tremendous odds against him, but he worked at it and was happy every day. They said it again when he decided to go into politics because he so loved this country – America – which had afforded him these opportunities as an immigrant. And he became governor of California. Born in Austria, if there wasn't a law against people born outside America becoming president, there are many who feel he would have won that if he wanted it. Actor Ronald Regan did it. Cowboy and soldier Teddy Roosevelt did it. Peanut farmer Jimmy Carter did it. Colonel Sanders didn't start KFC chicken franchises until he was 62.

One other quick note on goals. For some, it is best to keep it to yourself. It is certainly true that we live in a networked society. More and more with electronic social media. It has often been true that some people get ahead and reach their goals because of who they know or their wealthy parents. That being said, it is also true that **stating your goal out loud** to others gives partial satisfaction in their response of "oh, that's nice" or "good for you, I hope you make it". That partial *increase in satisfaction* equals a partial *decrease i*n *ambition*. It lessens the drive to achieve that goal. So you should **keep your goal to yourself** except when around someone who could be part of your active path to get there.

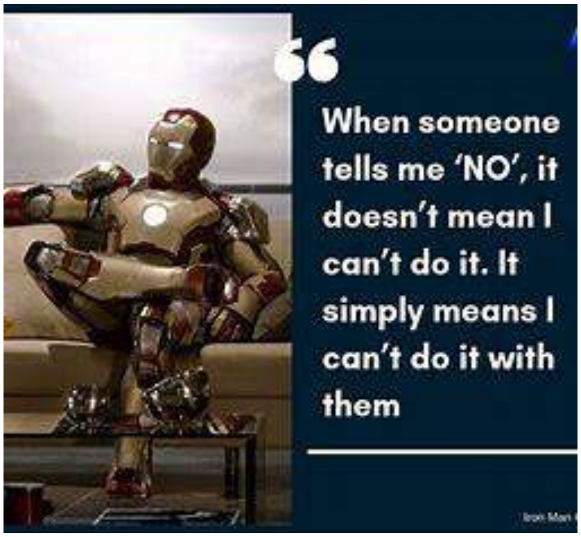
Identification of virtue - monsters, controlled monsters, and victims

1. If you catch them early enough, you can teach a monster to have decency. Not to stop being a monster – for whatever reasons that's what they are. They are born monsters, or created by tragedy. But be a controlled monster. A friend who grew up with and was friends with newly imprisoned drug dealers related the story that every single one of them told him the same thing. They were surprised at their end. They all said something like, "Who would have thought I'd end up in jail? I was driving a Benz last week!" The answer my friend gave was "Everyone thought so. We all told you you'd end up dead or in prison and we didn't want that for you." Monsters never see it coming. Never see Consequences.
2. If a monster is taught consequences at an early age, they often become the most valuable members of society. Leaders. Fearless. Strong. Virtuous. Virtue because they *choose* to be decent, not being decent because they are afraid of punishment or too weak to stake their own claim or stand up for themselves.
3. Do you think the person who turns the other cheek and does not fight back is virtuous? Far from it. They are the weak. That is cowardice, not virtue. There is no virtue in being a victim. Sometimes you will become victimized because your enemy is stronger, is smarter. There is no shame in that. The shame comes from not trying. Not defending yourself or others. The mother who steps in front of a car to protect her child will surely be ripped to shreds, and she knows it, but she will try. That is virtue.
4. When you couple virtue with someone capable: someone who can do what '*no decent person*' can do, that is the most valuable person around. His or her actions will protect those who cannot do what monsters can do. Even if they don't deserve it.
5. Do not mistake caring and feelings and soft words for a person of virtue. Not unless they are willing to stand up and be counted when the car comes. When the house catches fire. When things go bad.
6. Beware the true monster. *The ones who were never taught self-control.* They will end up slowly poisoning people by selling drugs, beating someone to death for being too weak to defend themselves, stealing instead of working for what they want, and ending up dead themselves or in prison, wondering why. A few will rise to great power and wreck the world for millions. I have seen this.

7. Know who you are, Decide to be *competent*. Even if you are a monster inside. Call upon it when needed. Therein lays the highest virtue, because monsters have a choice. The weak do not. They can only try and fail, which is a weaker kind of virtue, or not try and be ground up into someone else's meal, which has no virtue. The smartest know this and learn to recognize and employ monsters in the service of society to do what they cannot. We call them soldiers. Interrogators. Firemen. Bail agents. Spies. Assassins.
8. The doctor on the battlefield who can calmly look at a shredded platoon of 20 men cut to ribbons and tell the other doctors and nurses, "Put that one over there to wait, put those in surgery right away, and leave those three – there is nothing we can do for them ***so let them die***." It is called triage. Those who can do it are termed heartless by the weak, but they are exhibiting the height of virtue. Use all your abilities, even the dark ones.

   Especially your inner monster.

Do you learn to control yourself from the bottom up like a coward, afraid to stake his own claim? Or from the top down controlling the monster within when needed for superior results? You have a natural inclination, which may never have been revealed to anyone else. But you can choose. Choose well.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When someone tells me 'NO', it doesn't mean I can't do it. It simply means I can't do it with them
Iron Man

17 Probability & Psychology

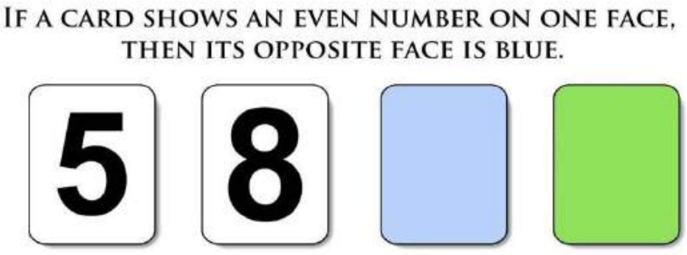
There is a branch of mathematics known broadly as probability theory. This includes statistics, numerical analysis, and other subsets. Statistics are the compiled true results of repeated actions which are not always the same every time but often form patterns or trends. Numerical analysis is a math technique to understand these things in a manner that can be programmed into digital computers to make their decisions smarter.

Average (or mean) is the sum of data points, divided by the number of data points. For example, statistically, there is an average height in a class, and an average weight, age, and so on. How tall is everyone here…..

In some samples or 'populations' of data, there may be one or two exceptional values that throw off a blind average a little. To get a better average, mathematicians sometimes throw out the highest and lowest values in a sample. For example, in a class, the average was ___ inches, but if we throw out X and Y, the average is now ___ inches, which is more useful. This tells us if the sample was very tight, or mathematically had low 'variance'. There is a more complex formula for 'variance' as well.

The median of a sample is the center value of a population. Take the highest and lowest values, add together, and divide by 2. In a class the median height of kids is (H + L)/2 = ____inches. Notice it is different than the average. There are uses for both average and median in life.

Experiment: This game is called the 'Wason Selection Task'. Four cards are shown. The first card shows number five, second card = number eight, third card = blue, fourth card = green. Test the truth of this condition: 'If there is an even number on one side of a card then the opposite side is always blue.' Without turning any unnecessary cards, which cards on the table would you have to flip over to prove whether the statement is true or false?


IF A CARD SHOWS AN EVEN NUMBER ON ONE FACE,
THEN ITS OPPOSITE FACE IS BLUE.
5
8

Most humans (90%) get this test wrong. The answer is both the number eight and the blue card. But what if the cards weren't so abstract? What if they actually referenced a selection problem you might encounter in real life—say, a policeman enforcing a law?

Take a law '*If a person is drinking beer, that person must be 21 or older.*' Four people are seen - the first is a stranger 'drinking beer,' the second is 'drinking Coke,' the third is known to be '16 years old,' and the fourth is known to be '21 years old'. Which two situations must be investigated? The underlying logic of this puzzle is exactly the same as Wason's original brain teaser—yet this time, thanks to understanding social situations, 75% of people correctly chose to check both what the "16 years old" is drinking and to ask for ID on the stranger "drinking beer". Amazing how a little ***change of context*** can make a big difference in our brains. A logical scientist-type will likely be one of the 10% of people who got it right using cards.

Gamblers and sports fans often talk about odds. Odds are the civilian way folks talk about what mathematicians call probability. If you flip a normal 2-headed quarter, the probability (or odds) that you get heads or tails is 50% either way. A scientist will make this probability statement carefully, saying only if the coin is fair and it doesn't land on its edge! For example, people may trick you by taking an unfair sample to make their point or even cheat in how the probability is collected. Watch me flip a quarter: I can cheat by always starting with heads-up on my thumb and flipping it. I will get heads far more than 50% of the time.

The lesson here is that when you are given a statistic or a probability, or someone tells you this is likely (or not likely) to happen, question the sources of the sample and how it is taken. Not always easy when folks want to deceive you.

You can improve your odds in life decisions which are not easy to quantify – to have expressed in numbers – by using logic. For example, many people complain that they are burdened with bad luck in life. The truth is bad luck happens to everyone and so does good luck. That's why it's called luck – good or bad, life happens.

A worthless person will often take no responsibility and moan their bad luck, or moan someone else's good luck. Or someone is unfair to them. A successful person will use whatever brains or strength they have to deal with bad luck or unfairness when it happens, and to be ready to take advantage of good luck when it happens. The worthless may be moaning so much that their brain does not notice the opportunity a supposed piece of bad luck brings them, nor the arrival of good luck which if they were paying attention they could enjoy.

Not all random chaotic bad luck can be defeated every time, not even most of the time. That's life. But just like the coin flip, good and bad will keep happening and the person who looks for opportunity to use their brain or other strength will be successful in the long run, while the person who does not will eventually get buried by life flipping its coin, and feel fate is against them.

Who do you want to be?

Human logic works well in nature, in the woods, or desserts. But it is flawed when trying to 'feel' an answer instead of knowing the math. Whether you are 'comfortable' with math or not, the math is happening so be aware of it as best you can in every situation. I guarantee someone else is!

For example, if you flip a coin and it comes up heads 5 times in a row, a loser might think, "It's due to be tails" and bet on tails. Wrong. The math says each toss of the coin is completely independent of the toss before it, so it's not 'due'; it's still 50/50. The person who says '5 wins in a row so it's on a streak!' is also a loser for the same reason. In the long run, they both lose, even if they win once or twice early on.

Lotteries are a way many governments raise money to help schools. Very nice. People who do not understand math think, 'It's only a little money that won't change my life, and I could win a fortune that will change my life!' True, but the odds of winning the big lotteries are smaller than being hit on the head by a falling meteor. Scientists are good at math and smart ones never play lotteries.

The stock market is a way to invest in companies. Some people notice that statistically, the stock market goes up in years when dresses are shorter and goes down in years when dresses are longer. While the data is true, the two things are not at all related. Statistically, the sample is not large enough (only 100 or so years 100 events in the sample). Depending on what is being measured, the 'variance' may be small or large, and the sample size needed to get a 'statistically significant sample' may be very large. Like >2,000 events for what makes the stock market go up or down. Much like flipping a coin, beware small sample sizes used by folks to predict a trend or make their conclusions. It is illogical. This also works for people who think their favorite team wins when they wear a certain shirt or socks – the data is true but the sample size is just too small.

Scientists will never accept a result or an eyewitness account from one person. Not even another scientist. There must be verifiable evidence like a different scientist repeating an experiment to see if they get the same result. This is part of the very powerful scientific method. First comes observation – you see something interesting. Then comes theory – you reason why it happened that way. Then comes verifying experiments – that confirm the original observation was correct or not. When experiment matches theoretical predictions about what will happen next time, you have a scientific fact. Very powerful.

Science never stops being skeptical. If a theory successfully explains and predicts something 90 times out of 100, that's very good and is accepted. But what about the other 10? When someone refines the theory in such a way that you now get 95 out of 100, it replaces the old theory. Builds on it. But it never stops. In college, each generation of scientists is taught by repeating the simplest experiments of the past to prove scientific facts for every generation. Breaking white light into a rainbow with a prism. Rubbing silk on glass or fur on rubber. Verifying the charge on an electron. By doing so, the new generation sometimes finds new truths. New facts.

Non-scientists get discouraged hearing scientists argue with each other all the time, and how often they disprove each other. Trust is lost. What they are missing is that the arguments happen at the bleeding edge of knowledge. As knowledge expands, you forget how much they've already got covered solid. Like the outside of a circle, as the circle of knowledge grows, the perimeter grows as well. That's science.

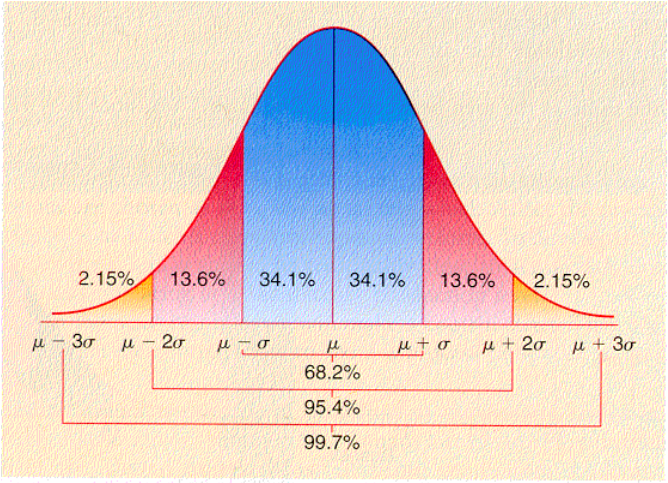
Still, there is part of all humans that rely on instincts, fear, and yes superstitions. Those coping mechanisms for a world of hunter-gatherers explained the physical world very well for low-tech survival. Those same mechanisms must be firmly set aside if we are to proceed to math and physics which increasingly have *no counterparts in modern life*, yet underlie if not outright control what is going on.

For those who want to dive deeper into the neuroscience of human bias, check out "*MAPS OF BOUNDED RATIONALITY: A PERSPECTIVE ON INTUITIVE JUDGMENT AND CHOICE"* by D Kahneman in a free pdf online.

In understanding actions of people, taking large numbers of them at a time into statistical samples is very valuable. The mathematician Gauss created a normal distribution curve of probabilities expressed by this historic and powerful equation:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{\frac{-(x-\mu)^2}{2\sigma^2}}$$

As often happens in physics and math, a graphic representation of the linear equations gives clarity. Shown below is the standard bell-shaped normal distribution curve of any series of events. The most likely event is seen in the middle with the biggest peak. Values less likely are shown to occur either way, whether larger or smaller. The most unlikely events tail off at the extremes of both sides. This is a 'normal' distribution':



As seen above, the 'normal' distribution results in most values falling within 1 standard deviation of the median, which for a symmetrical bell curve is also the mean. 99.7% of events then fall within 3 standard deviations. For many aspects of life, and physics, it is not easy or even possible to know 100% of many phenomena, but if you are within one, two, or three standard deviations the results are predictable enough to be useful. This introduces the concept of the law of diminishing returns, in which more and more effort is required to gain smaller and smaller improvements in accuracy. Eventually it is not worth the effort, like in polling every voter before elections.

Understanding statistics and probability is essential to anyone responsible for investments, business decisions, the sciences, and for anyone wishing better decision making in his or her own life. For those who wish to dive deeper, check out "*The Bell Curve'* by Herrnstein and Murray. For much of male human behavior, a *Pareto Distribution* more accurately represents the situation. Another powerful method to check out is called *regression analysis*.

By Request

The following items have been added from readers by their request. Of course there are thousands of hacks and tips and skills among humans that can be included, but my readers found they were ***instructive***, which was my goal. I thank them all for getting my intent to not just inform the young (which any idiot with web access can do) but inspire and train the young in competent ways to think about the problems they face. And will face in this century. They're going to need every skill they can master.

It occurs to me that as I look back on old knowledge – smelting metal from rock or stream beds, fishing with nets, irrigation – that there is much ancient knowledge lost to us, knowledge which is unneeded in this technological society of the 21st century. There is regret the most mundane lost skills were not recorded well enough to replicate. It then occurs to me that our own time and culture provide skills in each generation which I am seeing lost to the next, as the rapidly advancing technology around us makes such skills superfluous. Like operating devices manually instead of by voice, or even by remote control. Operating hand tools which are not electrically powered, but only useful depending upon the strength or skill in the hands of the wielder. It may be these skills will never be needed for our children and theirs, but then again perhaps they will. At worst, if taught to the young, it will provide them a foundation in how to think about things which links them to the past progress of knowledge, just as physics students are taught from ancient Greek concepts of the atom up through Galileo's telescopes and Ben Franklin's kite attracting lightning. Foundations are important, and I would hope there are things each generation takes for granted as common knowledge that fall into that category as well. How to record it for the young and what to retain? Did we grow up learning anything worth knowing? Do we have anything to teach beyond working a streaming video channel and operating the latest smart devices?

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STORIES AND CULTURAL FAIRY TALES

There are lessons taught to the young of our species in the form of fables, legends, and tales of adventure. Several prominent in my time are listed below with the recommendation they be shared with the next generation, lest they lose very hard-won wisdom. Of necessity, what is wisdom for one generation often seems harsh or even unnecessary to the next, yet I am encouraged that the writings of Shakespeare continue to be read and interpreted through the intervening centuries. There must be a common thread there. Something worthwhile. I am encouraged to feel there is hope that the lessons in these may prove useful to a generation who will be raised among another life form among us, the androids.

Our children will need all the help and wisdom they can get.

I recommend reading such tales to them out loud, even before they themselves are too young to fully understand them. It is a bonding no less important than the lessons and ethics embedded in that sharing. They may not understand, and if they do understand not agree, but they will know you have attempted to impart something of human heritage to them which may be enough for them to seek it out themselves as their strengths and interests allow. Try.

Brothers Grimm – rather dark, Germanic tales where everyone is out for themselves and cruelty is rewarded, unless the victims are very very careful. These were lessons needed at the time.

Tales Told In Holland – a way of teaching the history of Holland and its people to the young, sometimes amusing, sometimes as dark as Grimm.

Aesop's Fables – a positive way of trying to see both the evil and the good in life together, as one is never around without the other.

Curious George – a purely innocent exploration of the world around us for the very young, as seen through the eyes of a curious monkey.

Dr. Seuss – an entertainment with lessons on accepting that which you cannot control, embedded in worlds of chaos that somehow work out in the end.

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KNOT TYING & OTHER NON-ELECTRIC SKILLS

These are not just for fishing and climbing Mt. Everest. Check out YouTube free videos and have fun practicing each one. It is a skill set few have and I guarantee will one day be helpful, if not actually save your life! Teach the kids and they will love it. A knot a day keeps boredom away and improves confidence. Are there other skills you know you can teach your kids? Are there any?

Shoelace – one of the first knots a child learns is how to tie their shoes.

Surgeons – similar to the start of the shoelace know, but instead of simply looping a single strand, you insert it a second time before tightening. While it can still be loosened, it will come loose on its own less often, hence the reasoning of surgeons.

Fishing – many American knots are currently used, all of which bring the knot close to the breaking strength of the line itself. The knot is usually the weak point. My favorite is the Palomar. Go online and watch the tying videos.

> Palomar –excellent and easy for tying anything to end of a line
>
> T-Knot –excellent knot to attach something to the middle of a line
>
> Wrap – several variations of self-tightening knots
>
> FG – a self tightening excellent for tying a flat wrap between 2 different lines.

Sailor knots– sheepshank, stopper knot, clove hitch, alpine butterfly, zeppelin, and the bowline knot.

Mountain climber knots – figure 8 harness or bike, clove hitch, barrel, double fisherman, and Prusik.

Construction knots – square (reef) knot, sheet bend, figure 8, round turn and taut hitch.

Slip Knot (break into a car or a loose doorway) – the classic slipknot has lots of uses, right down to hanging condemned prisoners. Left your keys in a car? if you slip a cord with a slip knot in the middle around the ends of a car door, you might loop it around the door handle and get in. Same with house doors that open from the inside handle, if the frame is loose enough.

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GLOBAL WARMING IN AN ICE AGE

Let's go back a few millennia. The Earth on its own, without human interference, has been through several cycles of heating and cooling. These have a significant effect on the ability of carbon-based life to adjust and thrive.

Understand there are odd life forms on our world, chemically, but none have managed to dominate ecosystems in oceans or on land. One of the more interesting is the octopus, which does not employ iron in its blood but copper! Highly intelligent, these creatures may in fact be alien to Earth, brought here in a panspermia effort. Another are the creatures living near molten sulfur at undersea volcanic vents. These do not employ the oxygen-CO2 exchange cycle of most of Earth life, and would be quite at home on other planets or moons with similar environments.

Our best geologic records for temperature are found by knowing the chemistry of rock formation. Certain rock compounds only form above or below specific temperatures. By studying the geologic record, we are certain of 5 ice ages in the past 3 billion years. They vary in length.

Oldest known – Archean

2nd ice age - Early Proterozoic

3rd ice age – Late Proterozoic

4 th ice age – Permian

5th ice age – Quaternary

Note that we are technically within the last ice age, starting 2.6 million years ago. This is just a warming period, the same as the year without a summer during the time of George Washington was a brief extra cold period within this ice age.

It is widely accepted that humans have been heating up the planet for over a century by burning coal, oil, and gas. Earth has already warmed by almost 1.2 degrees Celsius (2.2 degrees Fahrenheit) since preindustrial times, and the planet is poised to race past the hoped-for limit of 1.5 degrees Celsius of warming. But fewer people know that burning fossil fuels doesn’t just cause global warming — it also causes global cooling. It is one of the great ironies of climate change that air pollution, which has killed tens of millions, has also curbed some of the worst effects of a warming planet. Warming and cooling already happen on their own.

Tiny particles from the combustion of coal, oil, and gas can reflect sunlight and spur the formation of clouds, shading the planet from the sun’s rays. Since the 1980s, those particles have offset between 40 and 80 percent of the warming caused by greenhouse gases. And now, as society cleans up pollution, that cooling effect is waning. New regulations have cut the amount of sulfur aerosols from global shipping traffic across the oceans; China, fighting its own air pollution problem, has slashed sulfur pollution dramatically in the last decade. The result is competing factors, some heating the Earth and some cooling it.

Here’s a pertinent example of competing factors: heating the overall atmosphere of the planet will warm the oceans. Warmer air and oceans will cause the polar ice caps to melt. Melting all that fresh water will cool the Earth and cause the current ice age to re-express itself.

An interesting short-term effect of melting the polar caps is that when all the extra fresh water enters the salt-water oceans, it is lighter and rises to the top. In the Atlantic, we anticipate the salt-water coastlines that we rely upon for fishing and feeding millions of people will be completely wrecked. Salt-water fish will disappear, as will the fishing industry dependent upon them. In addition, there are enormous circulatory systems in an all salt-water Atlantic Ocean, especially the ‘gulf stream’. This too will be altered or eliminated, causing severe changes in weather patterns.

Climate change is not the simplistic phenomenon presented by those screaming about global warming, nor so large and complex that the influence of mankind does not affect it. The truth lies in between. It is doubtful that at our current state of limited scientific knowledge and the adjoining severe industrial pollution levels, we shall be able to control what we do or know what we’ve done until the damage is obvious to a child.

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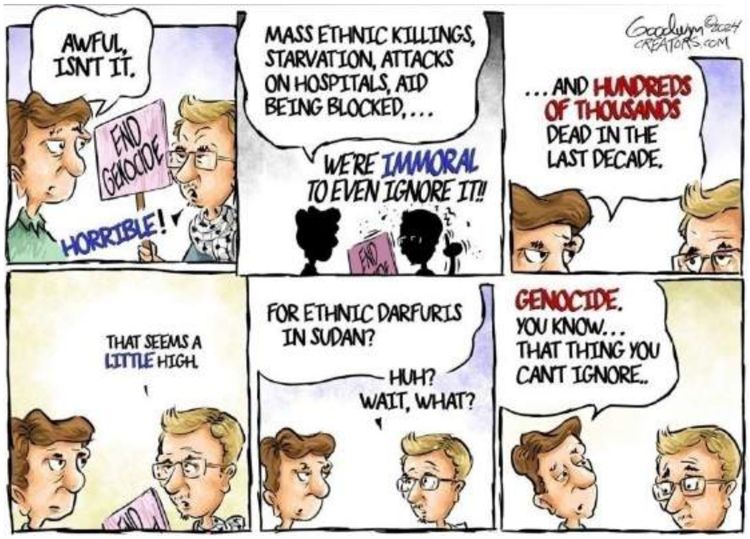
UNCOMFORTABLE TRUTHS

You will know of your own uncomfortable truths, learned perhaps through pain or loss. When they are old enough, pass them onto your children even if they make you look weak. It is knowledge worth knowing. Tell them and they may forget. Teach them, and they may remember. Involve them, and they learn. One day your life will flash before your eyes. Make sure it is worth watching. The greatest mistake you make in life is fearing that you will make one. Be brave with your offspring!

EX: Liberals would have you think slavery is a sin of racist whites of European descent. Slavery existed everywhere in the world. Today in Africa, there are an estimated 700,000 slaves. Not of white Europeans but of other Africans. The liberal "leaders" shouting against racism are silent on them. Why? Because they are not leaders who believe anything they say. They are extortionists seeking power.

EX: Conservatives love to call attention to the above self-serving liberal dogma while forcing their own belief systems on you by any means. They are all about obedience to those on top and authoritarianism, while liberals tend more towards deception while appearing to be your friend. Liberals govern better in times of plenty when they can distribute largesse to the population. Conservatives govern best in crisis when strong but unpopular decisions are necessary. Neither should be blindly trusted.


AWFUL, ISN'T IT.
END GENOCIDE
HORRIBLE!
MASS ETHNIC KILLINGS, STARVATION, ATTACKS ON HOSPITALS, AID BEING BLOCKED,...
WE'RE IMMORAL TO EVEN IGNORE IT!!
END
Goodwyn ©2024 CREATORS.COM
...AND HUNDREDS OF THOUSANDS DEAD IN THE LAST DECADE.
THAT SEEMS A LITTLE HIGH.
END
FOR ETHNIC DARFURIS IN SUDAN?
HUH? WAIT, WHAT?
GENOCIDE. YOU KNOW... THAT THING YOU CAN'T IGNORE..

EX: Under capitalism in a democracy or republic, people inheriting wealth, people excellent at manipulating others, or people with high specific skill levels live the best. 1% of the people hold 45% of the wealth, and charity & public projects are vital to keep the poor from overwhelming them. Under communism, a few insiders live the best. 1% of the people hold 45% of the wealth, and a secret police that works for them keeps the poor from overwhelming them. In a Kingdom or Dictatorship, 1% of the people hold 45% of the wealth, and a combination of charity and a secret police force keeps the poor from overwhelming them. The illusions told the powerless in each system are used to convince the poor to fight and kill the poor in another country or culture for the benefit of the 1%.

EX: The Christian bible says no one is in heaven – they will go to heaven when Jesus returns. Any who don't know this are not Christians, just the American versions who only believe the parts they want. And they will hate you for pointing this out. Beware people of faith not knowing their own religion. The other side of that coin are folks using religion not for morals or ethics (which is proper) but to explain physics (which is laughable if it wasn't so dangerous).

EX: When religion contrasts with scientific evidence, it rarely comes out well. The Earth is only a few thousand years old is still taught and believed (it is 4.5 billion). Humans and dinosaurs co-existed still believed (50 million years apart). A global flood covered the entire Earth during the time of man still believed (not even close). Biological evolution is not real still taught (every scientist, farmer and animal breeder knows better). Prayer can heal physical ailments taught and believed (makes lots of money for charlatans). The universe was created in 6 days (closer to 14 billion). Homosexuality is unnatural or a choice (the refusal to accept a reality with which you personally disagree). Earth is the center of the universe still believed (total self-importance at work). Illness is the result of sin or demonic possession (another self-serving fantasy for power over others). Science contradicts the existence of a higher power (it so does not – science deals with objective evidence to push back ignorance).

EX: One of the biggest truths never spoken of is also one of the simplest. It is in the interest of those who wish power to avoid this truth as they try to convince you that you will be happy if you do what they say. There is no such thing as a life without negativity, without pain. If you buy into a life without contrast or one that feels good all the time, you will never be happy. Accept that reality and life will be better for you.

EX: This evidence demands a verdict – 1.7 trillion dollars in student loans exist. In 2024, there are 10 million open jobs, most of which do not require a 4-year college degree. We are lending money we don't have, to kids who are never going to be able to pay it back, for jobs that do not exist anymore. A lot of very smart people are arguing what to do – even forgive the loans - while they continue to make even more loans. Ask the government WTF? I guarantee they will talk in circular arguments designed to never achieve a resolution. If you push, they will walk away from you with an attack on your intelligence or experience. (courtesy Mike Rowe)

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QUOTATIONS WHICH MAY HELP YOU GROW

As you grow and take your place on a planet of humans, you may find wisdom from these ancestors. Most humans never learn these lessons or actively oppose them. This is to your advantage. Several of these have kept me from driving off the road and reminded me of truths I already knew or felt.

- Einstein – Two things are infinite: the universe and human stupidity, and I'm not sure about the universe.

-Carlin: Trying to be happy by accumulating possessions is like trying to satisfy hunger by taping sandwiches all over your body.

- Lincoln: Whatever you are, be a good one

- Confucius: Preparation is the only path to success.

- Epictetus: There is only one path to happiness – that is to cease to worry about things beyond our will or strength.

- Aurelius: You have power over your mind, not outside events. Realize this and you will find your strength. All else makes you weak and your enemies will see this.

- Allen: 80% of success is showing up.

- Carnegie: People rarely succeed at what they are doing unless they are having fun.

- Swope: I have no sure formula for success; I do have a formula for failure – try to please everybody all the time.

- Purkey: You gotta dance like there's nobody watching, love like you'll never be hurt, sing like there's nobody listening, and live like its heaven on Earth. Or you can sleepwalk safely through life.

- Jewel: Do not lend your strength to that from which you wish to be free.

- Nietzsche: A thinker sees his own actions as experiments & questions – as attempts to find out. Success and failure are for him answers above all.

- Epictetus: Circumstances do not make the man; they reveal him.

- Plato: The measure of a man is what he does with power.

- Watts: When you get free from certain fixed concepts of the way the world is, or reality, you find it is far more subtle than you thought it was. Grow.

- Science: Anything which can be conceived by the mind of man can be achieved, ultimately.

- Jung: People will do or say anything to avoid facing their own souls. Shame is a soul eating emotion. Wholeness is not achieved by the cutting off extremes within yourself, but by integrating them into who you are. People are like plants – some grow best in light, some grow best in shade. Knowing your own darkness is the only way to deal with the darkness in other people.

- Einstein: Education is what remains after you have forgotten what you learned in school. Everyone is smart - if you judge a fish by how well it climbs a tree, it will live its whole life believing it is stupid. Help your children find their strength, find what they're good at.

Postscript

Much of what is in this short volume I knew off the top of my head. Mostly just from being alive and paying attention. I consider each item 'common knowledge' among different Americans. Only recently did I realize that this was only true for my generation. Yes, those who came before me had different 'common knowledge' appropriate to their times like farming and horsemanship, just as the internet-smart-phone generation of today has theirs. But I was sadly mistaken. Many today seem to universally lack any sense of useful knowledge, an ability to go forth confidently, without which you cannot possibly be expected to navigate the world. Anxiety and suicide are at record levels in a nation with plenty of food and technology. We drug children instead of celebrating their energy to test their environment.

So what has gone wrong?

The young to me included those who started new high-tech companies now straddling the globe. They gave me hope for the future. Yet the generations that follow, specifically Z, seem to have lost their way. Instead of confidence in facing their world and solving problems on the fly, they seemed to be resigned to being powerless in that world. Politically and socially aware, but lacking skill sets and 'common sense' to do anything about it.

I shudder. They don't even seem to see the problem. Double shudder.

If you can't see the problem, what are the odds you will stumble onto a solution? Perhaps this is the real motivation for my putting together this guide. I cannot help but be certain that **having a few lumps of odd practical knowledge in your back pocket** will help you with whatever challenges life throws at you. And it will throw them at you. Hard as it can. Family. Social. Political. Career. The only guarantee I can give the young is that it will be a bumpy ride and unfair. The only justice you will experience is either (a) grabbing a problem by the throat yourself, or (b) latching onto someone stronger who can do it for you. You do not have to be a 'leader' if it is not in you, but you must be strong or a follower of someone who is. Either way, knowledge will increase both your value to the strong and to yourself.

I was so lucky to be born in the 1950s. In my time I watched us send men to the moon, saw the Berlin Wall fall, saw computers shrink to handheld Star Trek devices, and all the rest. I've been an engineer, scientist, stockbroker, and bond trader, built a house, a husband twice, taught chess to 5-year-olds, hunted & ate my prey, milked goats, fenced, flown a plane, have software copyrights, put babies in women, taught chess, and helped dyslexics to read. There was joy amid the tragedy at every step.

Please try.

APPENDIX A – KEY SCIENCE CONCEPTS

For those who wish to dive deeper, look up the following scientific principles which repeat themselves in many disciplines. These key concepts will lead you to interesting and useful places:

COORDINATES AND REFERENCE SYSTEMS

INVERSE SQUARE LAW

PRINCIPLE OF CONSERVATION

PRINCIPLE OF CAUSALITY

PRINCIPLE OF TRANSFER

PRINCIPLE OF DIFFUSION

PRINCIPLE OF LEAST ACTION

PRINCIPLES INVOLVING ENTROPY & ENTHALPY

PRINCIPLE OF ABERRATION

GEOMETRY ON CURVED SURFACES

PRINCIPLE OF SYMMETRY

PRINCIPLE OF EQUIVALENCE

PRINCIPLE OF CONSERVATION

PRINCIPLE OF SIMPLIFICATION

ANALOGY FROM KNOWN PHENOMENON

REDUCTION TO SPECIAL CASES

STATISTICAL COMPLEXITY OF OBSERVATIONS

UNCERTAINTY PRINCIPLE

APPENDIX B – KEY BIAS CONCEPTS

For those who wish to dive deeper into why people act & believe what they do – including yourself - look up the following bias principles most of which people are not aware of, except those actively engaged in marketing, sales, prostitution, religion, and politics. An old wisdom among psychologists running experiments is that if a person is aware of the experiment, it throws off the results. Know these as best you can to better defend yourself:

COGNITIVE BIAS – mental processing flaws

- Anchoring bias
- Apophenia
- Availability bias
- Cognitive dissonance
- Confirmation bias
- Egocentric bias
- Extension neglect
- Framing effect
- Logical fallacy
- Prospect theory
- Selective memory

Assuming small differences are meaningful

Equating statistical significance with real-world significance

Neglecting to look at extremes (see Bell Curves & Pareto distributions)

Misplaced trust in coincidence

Getting causation backwards

Forgetting to consider outside causes

Deceptive graphs & tables

APPENDIX C BONUS

Many would detect what they term my dislike for the human condition in my writings and actions. It is not that admittedly flawed condition but humans themselves who I disdain. As evidence, and as a bonus to anyone getting this far, I offer this poem to the young, to the old, and to those in between whose hearts have not yet died.

"And Death Shall Have No Dominion"

Dylan Thomas, 1933

Dead men naked they shall be one

With the man in the wind and the west moon;

When their bones are picked clean and the clean bones gone,

They shall have stars at elbow and foot;

Though they go mad they shall be sane,

Though they sink through the sea they shall rise again;

Though lovers be lost, love shall not;

And death shall have no dominion.

END-MATTER: Books By This Author

sci-fi novels

Dominant Life Form

Alive Be Deemed

Robots Of Earth

Allegiance and Betrayal (coming 2024)

short stories

Science Fiction Anthology (7 stories)

Better Off Not Knowing (a play)

non-fiction

A Dyslexic Learns To Read By Power Lifting

Quantum Magic 101

Be sure to leave a review at your favorite retailer

or comment on his social media.

Knowledge should be shared and improved.